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# THE BODY AND HEALTH



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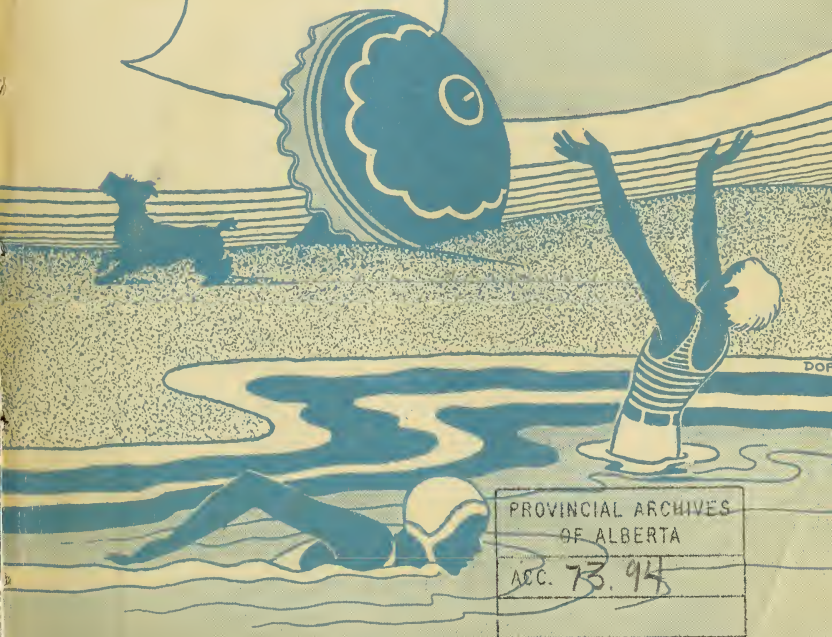
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## HEALTH—HAPPINESS—SUCCESS SERIES

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### THE BODY AND HEALTH (*GRADE SIX*)

Edited by RUBY SIMPSON and ELIZABETH SMITH



# **THE BODY AND HEALTH**

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*Recommended by The Departments  
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Ontario*

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## FOREWORD

The health program expressed in this new series is broad and inclusive. It provides for positive, consistent advances in the physical, mental, emotional, and social aspects of health. It embraces a number of essential goals—connected directly with *doing, knowing, thinking, and feeling*. In keeping with the best thought and practice, the whole child is considered.

Health education is vitally concerned with *doing*. An important measure of the effectiveness of the teaching is the extent to which desirable habits are practiced. Throughout the text, emphasis is placed upon a program of doing. Habit formation is specific, and the pupil is directed to the essential things to do in order to be healthy in body and in mind.

In the upper elementary grades, account must be taken of the enlarging horizons of the growing child. Some new ideas and concepts need to be presented and the older ones enlarged and strengthened. In this text the factual information concerning physiology, hygiene, and sanitation is authoritative and scientific. It is presented in simple, easy, understandable language, and offers strengthening rationalization just where it is needed. With the exception of certain technical expressions peculiar to the field of health education, the vocabulary is practically all within the limits of the first five thousand words of Thorndike's Teachers' Word List.

Attitudes and ideals unleash the power of the emotions to reinforce the practice of good habits of living. In this series the influence of *positive, satisfying* outcomes of these good habits of living is stressed.

The arrangement of the text material into units enables the pupils and teacher to concentrate upon a coördinated series of activities that relate to a definite part of the field of health education.

The aids included under "Things to Do and Think About" have been planned as integral parts of the text. They amplify and reinforce the pupils' progress toward the essential goals of doing, knowing, thinking, and feeling.

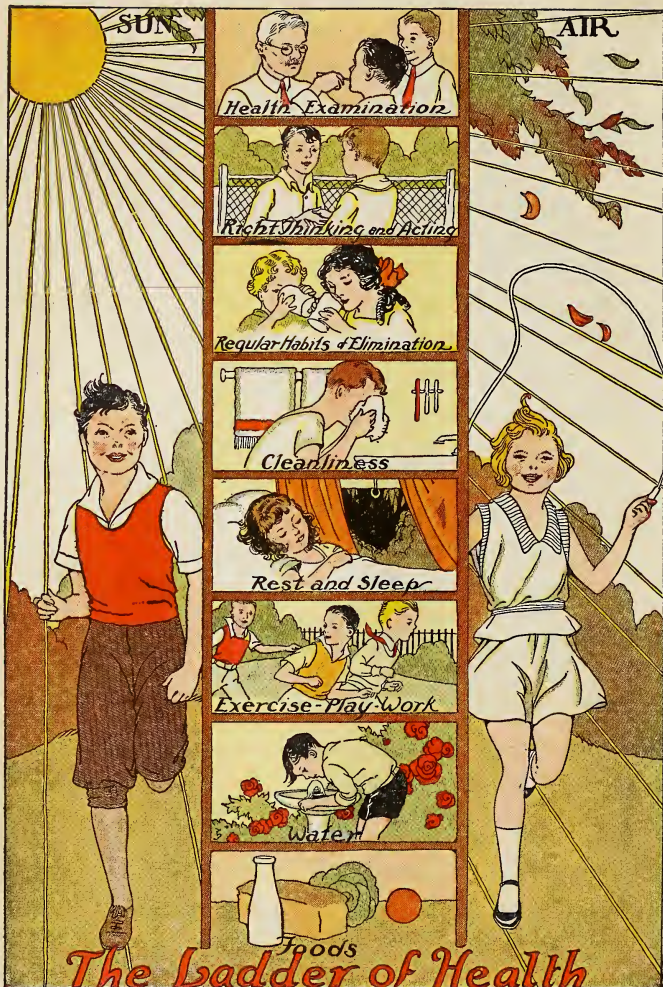
Tests in varied forms have been provided at strategic points. The illustrations also play an important part in the well-rounded program of health education.

Acknowledgment and thanks are gratefully extended to Mrs. Anna De Planter Bowes of the Philadelphia Child Health Society, and to Miss Anne Tierno and Miss Evangeline Hugg, elementary grade teachers in the Philadelphia Public Schools, for the constructive criticisms of various portions of the text which proved so helpful to the authors; The Macmillan Company, National Safety Council, American Child Health Association, Bureau of Home Economics of the United States Department of Agriculture, Dr. E. V. McCollum, and others for their kind permission to use illustrations and other material from their publications.

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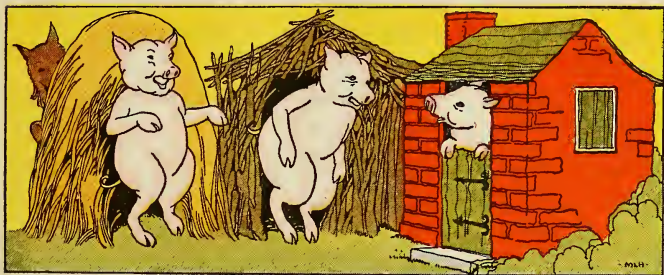
# The Ladder of Health

## UNIT I

### FOODS AND HEALTH

Once upon a time, three little pigs and a big bad wolf had some interesting adventures in house building. You remember that the first little pig built his house of straw and the wolf easily blew it down. The second little pig used sticks for his house and the wolf easily blew that one down, too. The third little pig built his house of bricks, but the big bad wolf could not destroy it.

Many things can be used for building houses, but there are some that are better than others. It is the same with our bodies. There are many different foods that we can eat, but there are some that are better suited to meet our needs than others. Good health and growth depend a great deal upon eating the proper kinds of foods.



## CHOOSING FOODS WISELY

### What Shall We Eat Today?

If your mother should ask you to tell her what to have for dinner or supper this evening, what would you suggest?

The foods we like best depend greatly upon where we live. If we grew up among the Eskimos in the far North, we would very likely enjoy strips of fat, very fat meats, and even tallow candles. These foods help to satisfy the needs for plenty of body heat in that very cold climate.

In our part of the world, we enjoy a greater variety of foods. Compare your dinner with the following one:

Tomato soup

Roast beef

Spinach, Buttered Beets, Mashed

Potatoes

Bread and butter

Milk for the children; Coffee for  
the grown-ups

Cole slaw (raw shredded cabbage)

Custard pudding

Let us see how this dinner is planned to suit our tastes. The meal starts with a dish of hot soup. A dish of fruit or a glass of tomato or orange juice might be used instead. This first course helps to stimulate the appetite and prepare the organs of

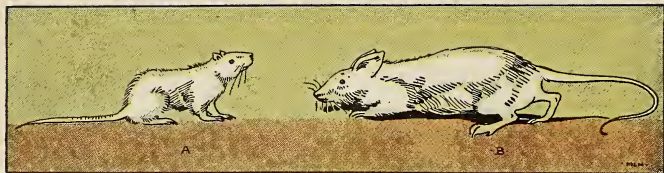
digestion for their work. The meat and vegetables are the "filling" courses of the meal. The salad gives us some raw vegetable in a tasty form. We put the finishing touches to our enjoyment with a sweet dessert, which leaves us with a satisfied and contented feeling at the close of the meal.

### **Food Makes a Difference:**

Whether or not we like foods is only one way of thinking about them. We must also think about the effects of different foods upon our bodies. Suppose we ask ourselves this question: "Does the kind of food we eat make a difference in our health and growth?" It will help us answer the question to notice the effects of different foods upon the health and growth of animals. White rats are often used for experiments with foods, because these little animals grow rapidly and are affected by foods in about the same ways that we are.

What would you say if you had only meat, potato, bread, and butter to eat? It sounds as if it might be a suitable diet, although we would get very tired of it before long. Let us see what happened to a white rat that was kept on this diet for several months. In the drawings on page 4, the rat lettered A had meat, potato, bread, and butter to eat. At the age of six months he weighed only 89 grams (about 3 ounces). This is less than half of what a normal, healthy rat should weigh at this age. In addition





### *FOODS MAKE A DIFFERENCE IN GROWTH*

to this, his fur was rough and stringy, and his bones were weak and poorly formed. His diet was not good enough to make him grow properly and keep him healthy. His twin brother, lettered **B** on the drawing, had plenty of milk and vegetables, besides meat, potato, bread, and butter. At the end of the experiment, he weighed 194 grams (nearly 7 ounces). This is more than twice the weight of his brother who had no milk and vegetables to eat. The fur of the larger rat was fine and smooth, which shows good health in an animal. His bones were strong and well-formed, showing that his foods contained the things that were needed for good health and growth. Many other experiments with foods have shown us that the kinds of foods we eat do have important effects upon our health and growth.

### **Our Bodies and an Automobile:**

Our bodies are sometimes compared with an automobile. Both are machines that “go.” Both work better when they are built of the proper materials, are supplied with the right fuels, and are properly



protected and regulated. Some of the things that can be compared are shown in the following table:

A COMPARISON OF OUR BODY MACHINE WITH AN AUTOMOBILE	
AN AUTOMOBILE	OUR BODY
BUILDING MATERIALS	
Iron Steel Copper Glass Rubber	Muscle-building Substances: The Proteins Bone and Teeth-building Substances: Calcium Phosphorus
FUELS TO MAKE THEM GO	
Gasoline	Heat and Energy Foods: Starches and Sugars Fats and Oils
PROTECTORS AND REGULATORS TO MAKE THEM RUN WELL	
Oil Grease Water	Protecting and Regulating Substances: Minerals Vitamins Roughage Water

## FOODS NEEDED FOR HEALTH AND GROWTH

### A Balanced Diet:

The foods we eat are sometimes called our diet. A balanced diet is one that properly satisfies all of

the body needs for food. From the comparison on the previous page, we see that the body needs foods for three principal purposes: (1) building materials for growth and repair, (2) fuels for heat and energy, and (3) substances for protection and regulation. These needs and the foods that help to meet them can be shown in another way, as follows:

BODY NEEDS	FOOD SUBSTANCES WHICH BEST MEET THE NEEDS
Growth and Repair	Proteins and Minerals
Heat and Energy	Starches and Sugars Fats and Oils
Protection and Regulation	Minerals, Vitamins, Roughage, Liquids

We can easily see from the second column in this list that a balanced, or adequate, diet contains proteins, minerals, starches, sugar, fats, vitamins, roughage, and liquids.

In order to satisfy *properly* all the body needs for food, we have to take several things into account. For example, foods are different in their usefulness in meeting these needs. Certain foods supply good protein for growth and repair. Some foods are better sources of heat and energy than others. Foods also differ in the protective minerals and vitamins they contain. One of the most helpful things we can do for good health and growth is to *use regularly a number of different foods*. This will help us to

make certain that anything which may be lacking in one food will be supplied by another. A good slogan to use in choosing the foods needed for good health and growth, as suggested by Dr. McCollum, a famous expert in the uses of foods, is this: "*Eat what you want, after you have eaten what you should.*"

The amount of protein and fuel that the body needs changes somewhat with the age of the person and with the kind of work that is done. The season of the year sometimes affects the amount of fuel foods that should be supplied.

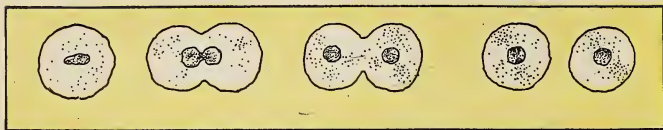
The cost of foods is an important thing to be considered. The substances that satisfy the body needs can be obtained in cheap foods and in expensive foods. It is possible to choose a balanced diet which will suit all pocketbooks.

## CHOOSING FOODS FOR GROWTH AND REPAIR

### Body-Building Foods

When you look at a brick house from a distance, the walls look as if they have been made out of one large piece of red stone. When you come closer, you can see that they are made of small bricks which are held together by the mortar between them. The single bricks are the building units of the house.

The building units of our bodies are tiny parts called *cells*. Living things are made up of tiny



*Cells grow and multiply by dividing in half, two complete cells resulting from the division of a single cell.*

cells which are so small that they cannot be seen without the use of a microscope. These cells grow and multiply by dividing in half. In this way two complete cells are formed from a single cell. Each of these two new cells divides into two more, so that a large number can be formed in a short time.

There are many different kinds of cells in our bodies. The skin is made up of large numbers of tiny flattened cells. This makes it possible for the skin to cover and protect the body. Bones are composed of cells that contain substances to make them strong and hard. We also have other kinds, such as muscle cells, nerve cells, fat cells, and blood cells. Cells that are alike in certain ways are grouped into parts called the *tissues* and *organs* of the body. For this reason we often speak of muscle tissue or bone tissue. The heart, lungs, stomach, and some other parts of the body that have a special kind of work to do are called the organs. Cells are living parts of the body. They grow and work best when they get plenty of food, air, and water. They are helped by right ways of living, and are harmed by wrong and careless habits.

**Muscle-Building Foods:**

When something is to be built, care must be given to the materials which are used. To make a wagon you do not have to be so particular about the things you use. An old box and a set of wheels will do, if you cannot find anything else. For an automobile different kinds of materials are needed for different parts. These have to be chosen with great care if the finished car is to run well.

As you have learned from outgrowing your clothes and from measuring your height and weight at different times, our bodies become larger and heavier as we grow up. For the building of good muscles, bones, teeth, blood, and other parts of our bodies, we must have certain kinds of materials that are obtained from the foods we eat. In addition to becoming taller and heavier, there is some repair work going on in our bodies all the time. All through our lives, some body cells are being broken down or worn out by the work of muscles in producing movements. Other cells are used up in the work of the kidneys in eliminating waste materials, in the work of the lungs in breathing, and in all other activities of the body in keeping us alive and well. In our bodies these broken down or worn out cells are constantly being repaired or replaced by new ones. The materials for the important repair work that goes on constantly within our bodies are also obtained from the foods we eat.





### GOOD PROTEIN FOODS

*For Building Muscles and All Other Tissues*

For the growth and repair of muscles and other tissues we must have substances called proteins. There is some protein in practically all foods, although the amount of it in many of the vegetables and fruits is quite small. See chart on page 36. The kind of protein that we eat has also been found to have important effects upon our health and growth. Animal proteins are better suited to the growth and repair of the body than the vegetable proteins. Note the larger number of animal foods in the following list of useful protein foods:

Milk	Fish	Nuts
Cheese	Eggs (The white	Whole-grain
Lean Meat	is almost all	cereals
	protein.)	

## Minerals for Good Bones and Teeth:

The bones and teeth are hard and strong. The principal building material for bones and teeth is a mineral substance called *calcium*, or lime. Milk and the green, leafy vegetables are our most valuable foods for supplying our bodies with calcium.

Calcium makes harder and better bones and teeth when another mineral called *phosphorus* is also supplied to the body. Phosphorus is found in a number of different foods, including meats, fish, milk, cheese, eggs, spinach, dried peas and beans, and oranges. Calcium and phosphorus are both used best by the body when certain substances called vitamins are also present.

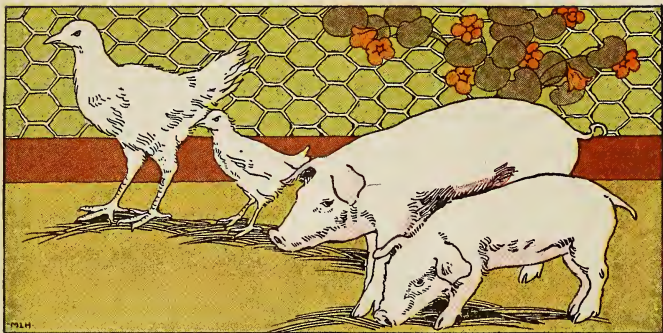
## Milk Is a Valuable Food:

Milk is the most nearly perfect food, because it contains so many of the different things the body needs for health and growth.

Milk is a body-builder. It supplies us with good protein for the growth and repair of muscles and calcium and phosphorus for good bones and teeth. Milk and the cheese and other dairy products made from it form our most valuable source of calcium.

Besides being a body-builder, milk contains some starch, sugar, and fat which help to supply us with fuel for heat and energy. The cream is rich in fat and is an excellent food fuel for the body.

Milk also contains vitamins. Whole milk is one



### *MILK MADE THE DIFFERENCE*

of our excellent sources of vitamin A. Other vitamins are not plentiful enough in milk to supply our needs. We must look to other foods for them. We can easily get them from the fruits and vegetables and other foods we eat.

Milk can be obtained in different grades and forms. Whole milk is the name given to milk as it comes from the cow. When whole milk is allowed to stand for a while, the cream rises to the top. This cream contains the fat that is in milk and is the part from which butter and cheese are made. Skim milk is the part which is left after the cream has been removed. Buttermilk is the liquid which remains after the butter has been made. Milk can also be obtained in condensed and evaporated forms, and even in a dried and powdered form.

Milk is usually pasteurized by heating it to about 142-145 degrees Fahrenheit, and holding it at that temperature for twenty to thirty minutes. This treatment kills disease germs that might be in the milk and makes it safer to use.

*Amount of Milk Needed.* Children of elementary school age should have about a quart of milk a day. Milk can be combined with foods in many ways, as in puddings and sauces. When taken as a drink, it should be sipped slowly.

When whole milk is too expensive to use plentifully, we can use the cheaper skim milk if we keep in mind some of the differences between them. When we remove the cream from milk, we take away from it the fatty parts which are excellent for heat and energy and which contain the vitamin A in the milk. We still leave behind in the skim milk valuable protein substances for growth and repair of muscles and other tissues and a rich store of calcium for good bones and teeth. The vitamins can be obtained from other foods, such as those in the lists on pages 17-22. Unsweetened evaporated milk and dried whole milk have about the same food values as the pasteurized forms of the whole milk from which they are made.

### **Eggs, Meat, and Fish as Body Builders:**

We can also obtain good protein substances for growth and repair of muscles from eggs, meat, and

fish. Eggs are easily digested. They also contain a number of different vitamins and minerals. Lean meat and fish are good sources of protein.

All through life, as we read on page 9, some body cells are being used up or worn out. Good protein substances are needed for the repair and replacement of these cells. Protein is also needed for the growth of muscles and other tissues of the body. For this reason, growing persons need more protein in proportion to their body weight than grown-ups. Keep the body supplied with plenty of good body-building foods, but not too much of them. The waste materials that form in the body from the use of protein foods are harder to get rid of than wastes from other kinds of foods. It is believed that an oversupply of protein foods puts a strain upon the kidneys. In the course of time they may become enlarged or weakened by this extra work. Weakened or diseased kidneys are harmed by too much protein in the diet. Meat is a very "tasty" food. It helps to satisfy our appetite for food in a very enjoyable way. Children of elementary school age, however, do not always need to have meat each day. There are other foods, such as cheese, fish, dried peas, beans, and lentils, which will furnish protein to add to that obtained from milk and eggs. Beginning about the age of thirteen or fourteen years, growth becomes more rapid and more protein foods can be used by the body to meet its needs.



## PROTECTING HEALTH AND GROWTH WITH FOODS

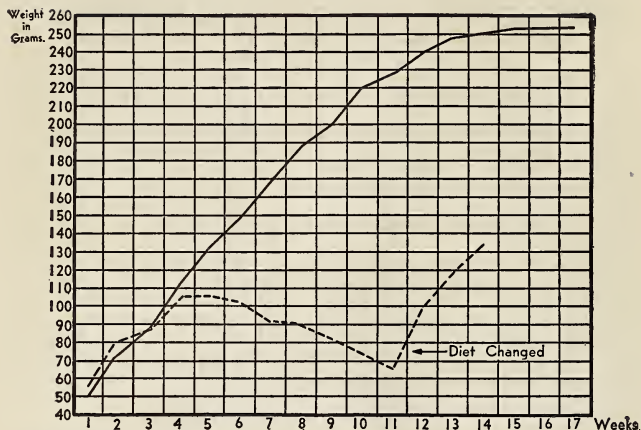
In the experiment described on page 3, the larger, healthier rat received milk and vegetables in addition to the meat, potato, bread, and butter that were given to his twin brother. The milk and vegetables furnished important substances that were not plentiful enough in the other foods to protect its health and growth. These protecting and regulating substances include *vitamins*, *minerals*, and *roughage*. *Water* is also an important protecting and regulating substance for the body. We must keep the body supplied with plenty of it.

### The Vitamins:

Vitamins are substances which are needed for the proper growth and general health of the body. They are found in certain foods. There are several different kinds of vitamins, known by letters, such as vitamin A, vitamin B, vitamin C, and vitamin D. Each vitamin has an important value to the body. Some foods contain a number of vitamins. Other foods are good sources of only one or two vitamins, while a few foods seem to be greatly lacking in them.

### Experiments with Animals:

The foods that contain the different vitamins have been chiefly discovered by experiments with



From experiments by H. C. Sherman and H. L. Campbell; courtesy of Mary Swartz Rose, from "Teaching Nutrition to Boys and Girls," The Macmillan Company, 1932.

The solid line shows how a white rat grew, steadily, week after week, upon a suitable whole wheat bread and milk diet. At Week 1, when the experiment began, the rat was 28 days old. The line shows that the increases in weight were steady and regular, as they should be. The weight was measured in grams. There are about 30 grams in one ounce.

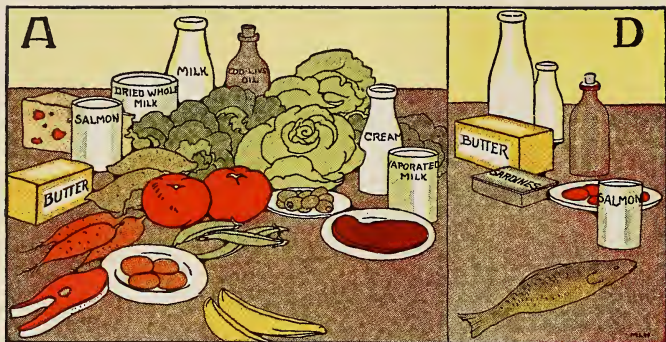
The dotted line shows what happened to the growth of a white rat that had everything in the whole wheat bread and milk diet *except vitamin A*, up to the eleventh week. Notice that this rat not only failed to grow after the fourth week of the experiment, but also actually lost weight as the weeks went by. At the eleventh week, vitamin A was added to the diet, and we see how quickly the rat began to grow again and gain weight. The diet after the eleventh week was a suitable one for health and growth.

rats and other small animals. These animals were fed day after day with certain foods, and the effects upon their growth were studied. Some of the animals grew strong and healthy. Others failed to grow properly and developed certain diseases. The pictures on page 12 show clearly that the foods that contained the needed vitamins kept the animals healthy and strong. When the vitamins were lacking, the animals failed to grow properly.

*Vitamin A:* The importance of vitamin A to good health and growth is shown in the graph on page 16. By the end of the fourth week, the vitamin A that had been stored up in the little animal's body had been used up, and it began to lose weight steadily. At the eleventh week, the only change that occurred was the addition of vitamin A to the diet. Notice how quickly gains in weight began again.

Vitamin A is beneficial to the appetite and digestion. It also helps us to resist colds and other infections of the nose and throat by keeping the moist, delicate lining of the nose and mouth in a healthy condition. When these parts are healthy, they are better able to resist these infections.

Animal foods, such as whole milk, butter, cheese, egg yolk, liver, and fish-liver oils are valuable sources of vitamin A. Among the vegetables, the green, leafy ones are important for this vitamin. These include spinach, beet and turnip greens, and lettuce. It is also interesting to note that the yellow



*Foods Rich in Vitamin A  
For Growth and the Prevention  
of Certain Infections*

*Foods that Supply  
Vitamin D  
For Good Bones and Teeth*

coloring matter in carrots, squash, and sweet potatoes can be easily used by the body in the production of vitamin A. For this reason, you see that these yellowish vegetables are also listed as very good sources of vitamin A.

*Vitamin B:* Vitamin B is helpful to the appetite and digestion and aids proper growth and the general health of the body. It also protects against a dangerous disease of the nervous system called beriberi.

Vitamin B is found in many different foods. Whole-grain cereals are valuable sources of it, because this protective substance is found in the germ and in the bran, or outside covering, of the grain.

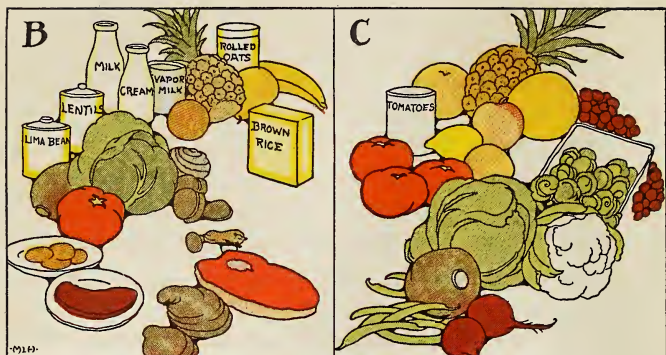
The germ of the seed is the part that swells, or sprouts, when the seed is planted. It is also the part which causes the flour or cornmeal to spoil more quickly when it is ground up with the other parts. For this reason, flour and cornmeal are usually refined by removing the germ and the bran from them. With these parts most of the vitamin B and minerals are also removed, so that the refined cereals contain less of these protective substances than the whole-grain ones.

In sections of far-off India, China, Japan, and the East Indies, persons sometimes suffer from beri-beri. This disease affects the nerves and muscles and often causes death. It has been found that this disease is frequent in sections where the people live principally upon white or polished rice. Persons who eat the whole-grain rice do not develop the disease. In America, however, we usually eat so many other foods that contain vitamin B, that our health is not affected by the lack of this vitamin in the rice we eat.

*Vitamin C:* Vitamin C is a substance which helps the body to build good strong bones and teeth. It also protects us against a disease called scurvy.

Fruits and fresh green vegetables are among the best sources of vitamin C, as shown in the drawing on page 20. The citrus fruits—oranges, lemons, grapefruit, and limes—are especially valuable for the vitamin C they contain. Fresh green vegetables include such foods as spinach, cabbage, turnip and





### *Good Sources of Vitamin B*

*For Good Appetite and  
Good Muscle Tone*

### *Good Sources of Vitamin C*

*For Healthy Gums and  
Teeth*

beet greens, celery, and fresh green peas. Tomatoes, both raw and canned, are valuable sources of this vitamin. Potatoes do not contain so much vitamin C as some other foods, but people often eat so many potatoes that they become an important source of this vitamin. Vitamin C is rather easily destroyed by cooking. For this reason it is well to eat some raw fruits or raw vegetables each day. Raw vegetables are suitable for use in tasty and attractive salads.

Persons ill with scurvy suffer from sore and swollen gums. The joints become tender and sore. Scurvy may even result in death. It would take



many pages to relate all the accounts that have been written about the troubles caused by scurvy during the past three or four hundred years. They include stories of sailors at sea, soldiers in army camps, persons in prisons and poorhouses, and people in towns and cities that were surrounded, or besieged, by their enemies. In all these places, there was a serious lack of fresh foods of any kind. Many of these outbreaks of scurvy took place in Europe, but some of them occurred in North America, especially during the long northern winters when fresh fruits and vegetables were not obtainable. In 1536 Cartier, the French explorer of Canada, reported that the lives of many of his sailors were saved by drinking a beverage made from the fresh bark and leaves of the spruce trees that grew there. The substance in the bark and leaves, and also in fresh vegetables and fruits, is now known as vitamin C.

*Vitamin D:* The body needs vitamin D in order to build good bones and teeth from the calcium and phosphorus supplied to it. Vitamin D is not widely distributed in foods. Our excellent sources are cod-liver oil and other fish-liver oils. We also get some vitamin D from the yolk of eggs, salmon, oysters, butter, and whole milk, as shown in the drawing on page 18.

Fortunately for us, sunshine that falls directly upon the skin has the power of producing this vitamin in the body. In cities where the dust and smoke

in the air keep out some of the rays of the sun and in places where the sun does not shine very long each day in the winter, it is especially important for persons to make up in some way for the lack of this vitamin. It is for this reason that cod-liver oil has sometimes been called "bottled sunshine." Take cod-liver oil when your doctor says you need it.

### **Minerals Are Essential to Health and Growth:**

A number of minerals are needed by the body. These serve as building materials for the bones and teeth and help to protect our health and growth.

*Calcium* and *phosphorus* are the principal building materials of bones and teeth. A small amount of calcium is also needed by the body cells and by the blood to help them do their work properly. It is a very important mineral substance for the body. The best foods to supply it have been named on page 11, and include milk and the green, leafy vegetables.

*Iron* is a mineral which is especially needed by the blood. It forms an important part of the red corpuscles of the blood, and makes it possible for them to carry the oxygen the body needs. This use of the red corpuscles is more fully described in Unit III, page 150. Some of the foods most commonly used to help keep the body supplied with iron include meats (especially liver and lean beef), the yolk of eggs, dried peas and beans, spinach and

other leafy vegetables, molasses, figs, raisins, prunes, potatoes, and whole-grain cereals. A slight amount of a mineral called *copper* helps the body to assimilate, or make use of, iron. Just as the body makes the best use of calcium to build good bones and teeth when some phosphorus is also supplied, so too it makes the best use of iron to produce good red corpuscles when a small amount of copper is present in the blood. There is a little copper in nearly all of our commonly-used foods, which makes it easy to keep the body supplied with this mineral substance.

A small amount of the mineral called *iodine* is needed by the body. Iodine helps to control the activity of an important part of the body called the thyroid gland. This gland has an important effect upon growth and other life processes. Iodine, therefore, is one of the important protective substances found in our foods. A lack of iodine is associated with a disease called goitre. In a large part of America the drinking water forms a good source of this mineral. Iodine was first discovered in 1812 by a French scientist who was experimenting with sea-weed. The salt water of the ocean contains iodine. For this reason sea foods are good sources of this mineral. In parts of the country where iodine is lacking in the drinking water, or where sea-foods are not accessible, physicians sometimes recommend iodized salt, that is, common table salt to which

iodine has been added. Meat also contains some iodine but in much smaller quantities than is found in sea food, and it is desirable to include some sea food in the diet, if possible.

### **Importance of Coarse, Bulky Foods:**

Many vegetables and fruits contain coarse, bulky foods which are not digested with the other parts of the food. These bulky parts are valuable in stimulating, or making more active, the muscles of the stomach and intestines. This is an aid to the digestion of food and the elimination of waste materials from the body.

Some coarse, bulky parts are found principally in vegetables, fruits, and whole-grain cereals.

### **Water Is a Necessity of Life:**

The body needs to be supplied regularly with water. Persons can live for weeks without food, provided they are supplied with water during this time. Without water, death results in a few days.

Most of the water the body requires is needed to replace that which is lost in the process of eliminating waste materials from the body through the kidneys and the skin. This total daily loss of water amounts to several quarts. It must be promptly replaced, for the body does not store up water. Plants store water in their stems and leaves, but our bodies do not have a reserve supply of this important substance.



### *DRINK PLENTY OF WATER*

Some water is taken into the body with the foods. More water is supplied by the liquids we drink. It is usually necessary to drink from four to six glasses of water a day in addition to that taken with our foods. Avoid the use of coffee and tea. They contain a harmful substance called caffeine. Caffeine is a stimulant, and is too exciting and harmful to be used at all by growing persons, and is sometimes injurious to grown-ups. Coffee and tea should not take the place of the milk that is needed by growing children. When you drink a quart of milk a day, there will be no need for coffee and tea with the meals.

### **The Protective Foods:**

We have learned that milk is valuable for supplying the body with good body-building substances



and with minerals and vitamins that the body needs. Vegetables and fruits also help to keep us supplied with minerals and vitamins that the body must have for good health and growth. For these reasons milk, vegetables, and fruits have been called the protective foods. Eggs are sometimes included with the protective foods because they also supply the body with good body building substances as well as minerals and vitamins. These protective foods help to make up for a lack of good body-building substances, minerals, and vitamins in some of the other foods we eat. They protect our health and growth from the harmful effects that come from living too much on foods that do not contain good proteins or lack the necessary minerals and vitamins. These are the foods to keep in mind when you follow Dr. McCollum's slogan, "Eat what you want, after you have eaten what you should."

### USE VEGETABLES AND FRUITS PLENTIFULLY

Vegetables and fruits are plant foods. It is interesting to learn the different parts of plants that we use for our vegetable foods. Potatoes and onions are *roots*, or *tubers*, which grow beneath the ground. Celery and asparagus are *stalks*, or *stems*. We use the *leaves* of spinach, lettuce, and cabbage, and the *seeds* of beans and peas. Tomatoes and melons are the *fruits* of the plants on which they grow.





*Eat Vegetables and Fruits All Through the Year—  
Fresh—Canned—Dried*

### **Vegetables:**

The chart on page 36 shows that vegetables contain some proteins, carbohydrates, and fats. They differ greatly in the amounts of these substances that they contain. The largest amounts are usually found in the roots and tubers, such as potatoes, turnips, and carrots, and the seeds, such as beans, peas, and the cereals.

Vegetables, especially the leafy ones, are very important sources of vitamins. Many vegetables contain several different vitamins.

Vegetables are important sources of minerals. The leafy vegetables form a valuable source of the

calcium which is needed for the bones and teeth. Vegetables also contain iron, phosphorus, and copper that the body needs.

Many vegetables contain some coarse, bulky, indigestible parts which are useful in stimulating, or making more active, the muscles of the digestive organs. This makes vegetables useful for aiding the digestion of food and the elimination of waste materials.

Fresh vegetables contain a large amount of water, and help to supply the body with some of this important substance.

On account of the vitamins, minerals, and roughage in leafy vegetables, they are often called protective foods. They help to protect the body from the harm which would come from living too much upon foods that do not contain enough of these valuable substances.

In selecting vegetables for our meals, the following suggestions are repeated from an earlier grade:

Use: Potatoes daily at one or two meals.

Leafy vegetables—two servings daily if possible.

One or two other vegetables a day besides the potatoes and the leafy vegetables.

In winter, in a large part of North America, a number of the most important vegetables are rather expensive because they have to be brought long distances. Therefore, in a lower cost diet, we should

Use: Potatoes daily.

Leafy vegetables at least three times a week.

Tomatoes three or four times a week.

Dried beans or peas one to three times a week.

Some other vegetables daily if possible.

As cooking destroys vitamin C rather easily, a fresh, raw vegetable should be eaten daily. This can often be served in the form of a tasty salad. Remember to wash vegetables thoroughly before eating them. This is especially needed when they are taken in a fresh, raw state.

### **Fruits:**

Ripe fruits contain sugar which the body can use as a fuel for some of the heat and energy it needs. Unripe fruits contain a large amount of starch and are rather hard to digest. Overripe fruits are unwholesome because they are very likely to disturb our digestion.

Fruits contain vitamins and minerals. As many fruits are eaten raw, none of the vitamins in them are destroyed by the heat of cooking. Many fruits contain some coarse, bulky, indigestible parts which are useful in aiding digestion and the elimination of waste materials. The mild acids in many fruits are also useful for these purposes.

Fruits are especially valuable for breakfast menus, for desserts, and for school lunches. Use

fruits as well as fresh vegetables plentifully when they are in season. At such times they are cheapest and have the finest flavor. Be sure to wash fruits well before they are taken into the body.

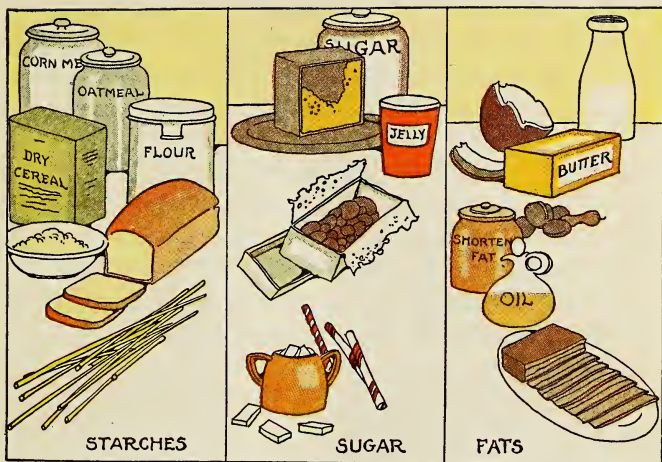
With the use of cold storage, canning, drying, and other methods of preserving, it is possible to bring foods from far-away places, and to keep them in good condition long after the growing season is over. It may be truly said that our diet throughout the year is better even than that of the kings of old, for they depended chiefly upon drying, smoking, and spicing to preserve their foods.

## FOODS FOR HEAT AND ENERGY

### The Fuel Foods

In comparing the body with an automobile, we found that both machines need the proper kinds of fuel to make them *go*. An automobile engine is built in a way that enables us to use the power, or energy, of gasoline to drive the car. A large amount of heat is produced when the gasoline vapor is exploded in the automobile engine. As many of you know, some of this heat is removed by the cooling system of the car. When the fan and radiator are not working properly, the engine soon becomes overheated.

Foods serve as fuel for the body. We use up, or *burn up*, this fuel in the body to supply us with energy. It takes power, or energy, to move any part



### ***GOOD FUEL FOODS FOR HEAT AND ENERGY***

of the body or do work of any kind. Heat is produced when fuel is used up in the body. It is this heat which makes it possible to keep the body temperature at about 98.6 degrees Fahrenheit at all times, winter and summer, indoors and out. The body also has a means of regulating the amount of this heat. It can get rid of extra heat when there is too much, produce more heat when it is needed, and prevent too rapid loss of heat when the body needs to keep all the heat it can.

### **Our Best Fuel Foods:**

The body gets most of its energy and heat from using up the starches, sugars, fats, and oils that are



in the foods we eat. Vegetables and fruits supply us with the starches and sugars that we use for fuel. Starches and sugars together are sometimes called the carbohydrates. Fats and oils produce about twice as much heat and energy as the starches and sugars. The fats are obtained chiefly from animal foods, such as the fat in meats, certain kinds of fish, and the yolk of eggs. Nuts are rich in oil that is a valuable fuel for the body.

Some of the best fuel foods are given in the following lists and are illustrated on page 31.

GOOD FUEL FOODS		
THE CARBOHYDRATES		FATS AND OILS
Foods Rich in Starch	Sugars	Foods Rich in Fats and Oils
Cereals: Wheat Rye Corn Rice Oats Bread of all kinds Macaroni Potatoes, and many other vegetables Fruits	Sugars: Granulated and pulver- ized form Maple sugar and syrup Corn syrup Molasses Honey Ripe fruits	Butter Cream Fat meats Oleomargarine Lard Peanut butter Olive oil and other salad oils Egg yolk Nuts

### Choosing the Fuel Foods

#### The Starches and Sugars:

The foods that supply us with a large part of the starches and sugars are the cereals, or grains, and



the vegetables and fruits. In the process of digestion the starch is changed into a form of sugar. This sugar is then used by the body for producing body heat and energy.

Bread is a commonly used food which helps us to meet the body's needs for fuel. Bread that is made from whole wheat flour contains vitamins and minerals that are lost when white or refined flours are used. For this reason bread and milk together make an excellent combination of foods. The milk helps to supply the body with minerals and vitamins that are lacking in the white bread flour. When persons have but little to spend for food, they are very likely to use cereals and grains rather plentifully because they are among the cheapest foods. In such cases it is a very wise thing to choose at least half of these foods from among the whole-grain cereals. In this way, they get more of the vitamins and minerals that they must have for good health and growth. Persons who can buy liberally of fresh vegetables, fresh fruits, milk, and eggs do not need to depend so much upon the cereals they eat for their vitamins and minerals.

Cereals in some form are usually found in a breakfast menu. Hot cereals are nourishing and well suited to cold weather. Prepared crisp breakfast cereals lend themselves to combinations of milk and fruits in season and help to form useful and pleasant foods the year round.



*Milk and the cereals make a fine combination of foods:  
Milk for body building—Cereals for fuel*

Sugar is a good fuel food. White, granulated sugar supplies the body only with fuel. It does not contain vitamins and minerals. When sugar is obtained from the juice of the sugar cane, a substance called molasses is left. Genuine cane molasses is a sweet with a real food value. It contains both calcium and iron.

It is necessary today to caution many people against eating too much sugar. We take sugar into our bodies in a natural form in milk, ripe fruits, and in some vegetables. More sugar is taken in the form of the sweetening that is added to so many of our foods in their preparation for the table. In order to keep from eating too much sugar, it is well to eat sparingly of foods containing large amounts of sugar, such as candy, pastry, and sweet cakes. When candy is eaten, it should be used at the close of a meal, and not just before or between meals.

## **The Fats and Oils:**

Fats and oils are excellent sources of fuel. They contain about twice the heat value of the starches, sugars, and proteins.

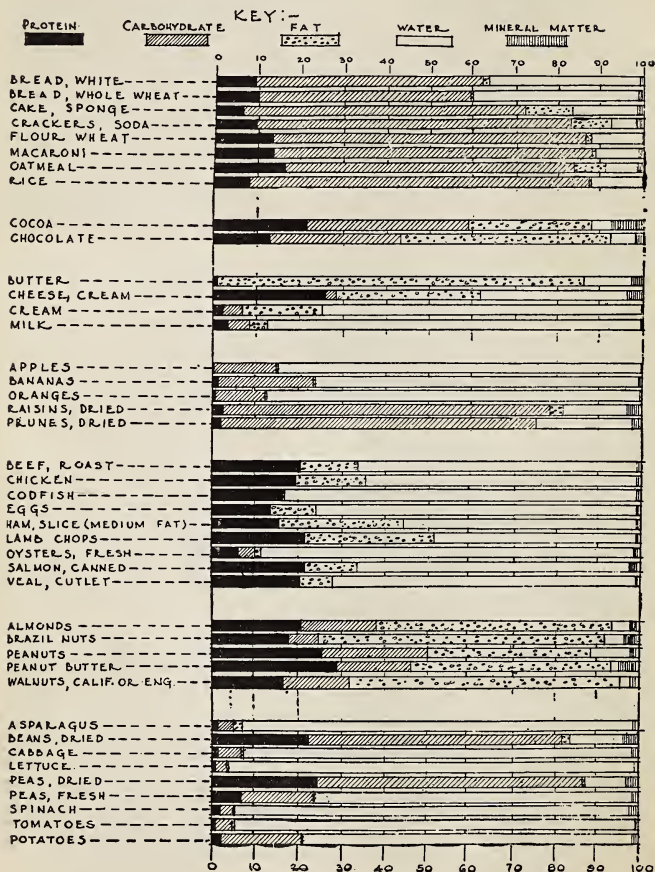
Foods rich in fats and oils should not be used to excess in hot weather. They should be used in smaller quantities when trying to reduce the weight. In cold weather the fats and oils are valuable for supplying extra body heat.

It should be remembered that fats and oils are harder to digest than starches and sugars and should not be used to excess. Fried foods should be avoided for this reason. Butter, cream, yolks of eggs, and nuts contain a form of fat and oil that is more easily digested.

Fats help to make some foods taste better. A little fat with some kinds of meats makes them tastier. Butter improves the flavor of many foods and is one of the most easily digested and useful fats. Butter is also a rich source of vitamin A.

Some fats and oils are rich sources of vitamin A. This is especially true of butter, cream, and cheese. Lard, a form in which fat is commonly used, is lacking in vitamins. Salt pork is also lacking in vitamins. Therefore, when lard and salt pork are used as the principal sources of fat, plenty of whole milk should be used to help supply the body with the vitamin A it needs.

## Proportions or Per Cent of Food Substances



## **Storing of Fat in the Body:**

Persons occasionally eat more fuel foods than the body can use at the time they are eaten. Some of this extra fuel is often stored up in the form of fat under the skin or around some of the organs of the body. At a later time, when the needs for heat and energy are great, this storehouse is drawn upon for extra fuel.

## **GROWTH AND CHANGES IN WEIGHT AND HEIGHT**

When children are healthy and eat enough of the proper kinds of foods, they will grow steadily taller and heavier. In many schools pupils are weighed each month, and their height is measured two or three times a year. These records are written down and compared with the rate of growth given in the tables on pages 307-308.

If you do not gain weight steadily for several months, or gain too much, you should ask a physician about it. It may be that you are not eating the right kinds of foods, or too much or too little food. It may also be due to other things that affect your health, such as too little exercise, rest, or sleep. It may be the result of diseased tonsils, enlarged adenoids, or abscessed teeth.

## **Weight and Height:**

The weight and height of a great many normal

children of different ages have been obtained and the averages put in the tables you will find on pages 307-308. These figures are not so useful in connection with health and growth as the monthly and yearly gains you make in weight and height. Persons in certain families tend to be heavier and taller than persons of the same age in other families. It will be interesting, however, to compare your height and weight with the average for your age in these tables. If you are very much above or below the average weight for your height and age, the suggestions given in the next few pages should be a help to you.

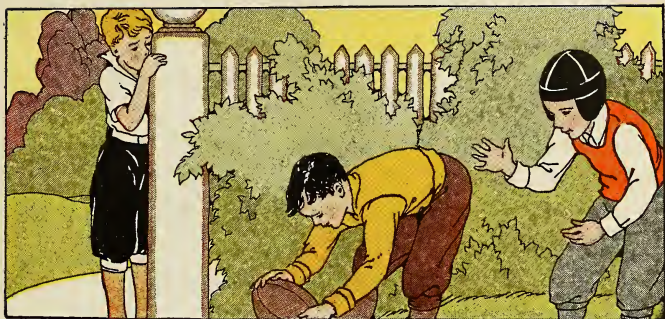
### **Underweight and Malnutrition:**

Being too much underweight is a condition which needs careful attention and treatment.

In some cases underweight is caused by too little food. Many more cases are caused by the wrong kinds of food or by physical defects which interfere with the proper use of the food which is taken into the body.

Many persons who are underweight suffer from a condition known as malnutrition. The word malnutrition is made up of two words, *mal*, meaning bad, and *nutrition*, meaning nourishment. In these cases, something is interfering with the nourishment of the body. It affects children and grown-ups, and is found among the rich and poor.





### *OUT OF THE GAME*

Persons suffering from malnutrition tire easily and cannot play as long or study as well as they could if their bodies were properly nourished. The muscles which help to hold the body erect are weakened, and poor posture results. Resistance to disease is reduced.

The following things are helpful in preventing or correcting underweight and malnutrition:

1. Go to a physician for an examination. Have physical defects promptly corrected. These include such things as abscessed teeth, diseased tonsils, and enlarged adenoids.

2. Plan the meals carefully. Eat plenty of good, nourishing body-building foods. Do not let peculiar ideas about foods keep you from eating those you need for health and growth. Remember that the time to eat candy and pastry, if at all, is at the close of meals, not between them.

3. Arrange for rest periods throughout the day and get plenty of sleep at night.

4. Make sure that waste materials are promptly eliminated from the body.

5. Keep monthly records of your weight and strive for regular gains. If your school has a *nutrition class* for underweight children, join it and follow the teacher's directions carefully.

### **Overweight and Reducing:**

Being somewhat overweight is usually less harmful to health when you are young than later in life. At any age, however, those who weigh as much as twenty per cent or more than the averages given in the tables on pages 307-308, are not able to do some things as well as persons who are not excessively overweight. Overweight persons cannot move quickly enough to play skillfully in many kinds of games. Excessive overweight is not good for those whose work requires them to stand. Excess weight often puts extra work upon the heart and other organs of the body, causing damage to them.

Some cases of overweight result from diseased conditions within the body. These require medical attention for their control. Others are due to over-eating and lack of exercise.

A reducing program calls for increase in exercise and a reduction in the amount of starches, sugars, fats, and oils that are eaten. Fruits and vege-

tables should be plentifully used in a reducing diet. Do not attempt to reduce the weight too quickly. It is always best to follow the advice of a physician in reducing excessive weight, so that the body will not be injured. *No child or adult should go on any strict or rigorous diet without first consulting the family physician.*

## MEASURING FOOD VALUES ACCURATELY

There are times when it is useful to know the amount of heat or energy that is being supplied by the foods we eat. For this purpose, a unit of measurement called the *calory* (kal'ō-ri) is used. A calory, as used in experiments with foods, is the amount of heat needed to raise one pound (about a pint) of water four degrees on the Fahrenheit thermometer, or one kilogram of water one degree on the Centigrade thermometer. The calory is merely a measure of an amount of heat, just as the inch is a measure of length, and the pint and quart are measures of liquids.

As a result of many laboratory experiments, the amount of heat given off by the burning up of each kind of food has been determined. Further experiments have shown that food gives off about the same amount of heat whether it is used up in the body or burned up outside the body. Careful calculations are then made to determine just how many

calories of heat and energy are required by our bodies under many different conditions.

### **Food Requirements in Terms of Calories:**

The average total number of calories needed per day by children varies with different ages. For boys twelve years old this need is placed at 2,300-3,000 calories per day, and for girls of this age from 2,100-3,000 calories per day. In a general way, boys require a larger number of calories than girls, principally because of the more active lives of the boys. The amount needed by both boys and girls increases with age up to about the end of the growing period.

Experiments have shown that a man of ordinary size, when not doing any special muscular work or exercise, requires from about 2,500 to 3,000 calories a day. Women, as a rule, need a little less than this amount. Hard muscular work will raise these needs up to 4,000 or even 5,000 calories per day. Resting quietly in bed, however, calls for 1,700-1,800 calories a day.

The season of the year has an effect upon the number of calories needed. More calories are needed in cold weather than in hot weather in order to keep up the body heat when the outside temperatures are low. Fats are especially valuable fuel foods in cold weather because they contain about twice the heat values of the starches and sugars. In hot weather, fewer calories are needed. Fruits and veg-

etables and salads are useful hot weather foods because they have fewer calories in them than many other foods.

It is usually not necessary to count the number of calories in our foods. A diet which regularly contains the foods discussed earlier in this unit will meet all the body needs for health and growth. This is especially true when foods are chosen so that about ten to fifteen per cent of the calories are obtained from proteins, about thirty-five per cent from the fats, and fifty to fifty-five per cent from the starches and sugars.

### **100-Calory Portions of Food:**

When it is necessary to count the calories in the diet, the 100-Calory Portion of food has been found to be a convenient way of doing it. A list of 100-Calory Portions of food will be found on page 305.

## **PLANNING A DAY'S MEALS**

In planning menus or selecting foods to eat, you should look farther ahead than the next meal. Choose foods for each meal in such a way that the total amount for a day will meet the body's needs in a satisfactory way.

A few sample menus are given on page 44. In Group I, the biggest meal is the evening dinner, or supper. A lunch is suggested for the middle of the day. In Group II, the noon dinner is the biggest



meal, followed by a lighter supper at the end of the day. You can easily suggest other foods to use in place of those named here. For additional suggestions for the noon lunch prepared and eaten at home, see pages 302-303.

## GROUP I

<i>Breakfast</i>	<i>Lunch</i>	<i>Evening Dinner or Supper</i>
Orange.	Macaroni and cheese.	Roast beef.
Oatmeal, with milk and sugar.	Whole wheat bread, with butter.	Spinach.
Cocoa, with milk and sugar.	Milk.	Buttered beets.
Buttered toast.	Baked or raw apple.	Mashed potatoes with gravy.
Soft boiled egg.		Raw shredded cabbage salad.
Milk for children. (Coffee for grown-ups, if desired.)		Bread, with butter.
		Milk for children. (Coffee or tea for grown-ups.)
		Custard pudding.

## GROUP II

<i>Breakfast</i>	<i>Lunch</i>	<i>Evening Dinner or Supper</i>
Blueberries.	Broiled lamb chops.	Mixed fruit salad with mayonnaise dressing.
Breakfast cereal, with milk and sugar.	Whole boiled potatoes.	Cottage cheese.
Poached egg (if desired).	Spinach.	Bread, with butter.
Whole wheat bread, with butter.	String beans.	Milk for children. (Coffee for grown-ups if desired.)
Milk for children. (Coffee for grown-ups, if desired.)	Bread, with butter.	Chocolate pudding.
	Lettuce and tuna fish salad.	
	Milk for children.	
	Cold melon.	

What are some of the ways in which the suggestions given on pages 2-43 have been followed in the menus given above? Let us consider a few of these suggestions. First, let us consider the protective foods.

Important protective foods are milk, green vegetables, and fruits. Eggs and meat are sometimes included with the protective foods in order to be sure that good protein foods are provided for the growth and repair of muscles and other tissues. In the menus on page 44, a glass of *milk* is listed for children at each meal. Grown-ups will get some milk in a number of the foods that are suggested. With regard to the *vegetables*, we have spinach, beets, and cabbage, besides potatoes, in Group I menus. In Group II, we find spinach, string beans, lettuce, and tomatoes, in addition to potatoes. *Fruits* fit nicely into breakfast menus and are also useful for desserts and salads at the other meals. Thus we find oranges or berries in the breakfast menus. Fruits are suggested for desserts at two of the meals, and for a salad in another.

As the body must be supplied with plenty of fuel for heat and energy, let us see how we have cared for these needs in our meals. If the body is not supplied with enough fuel foods, it may use up too much of the good body-building protein foods in order to supply the energy that the body must have to keep us alive and enable us to play and work. In

the list on page 32, we find that the starches, sugars, fats, and oils are good fuel foods for the body. The cereals are among the best and cheapest fuel foods. In our meals the cereals appear in a number of forms. There is bread at each meal, and the butter used on it adds greatly to its fuel value. Fats and oils have about twice the fuel value as the starches and sugars. Cereals also are included in other forms, such as breakfast cereals and macaroni. Potatoes consist largely of starch and form another important source of fuel for the body. We have included potatoes in each of our dinner menus. Milk is also valuable for the fuel it supplies to the body. Sugar is another valuable fuel we get in a number of the different foods we have chosen for these meals.

For body-building foods, good protein is provided in several forms. Milk is one of our good body-building foods. Other good protein foods include the eggs suggested for breakfast and in the puddings and sauces. Meat, once a day, will be found in each of the dinner menus. Cheese is also a good protein food and forms a good substitute for meat. It is suggested for the lunch in Group I and the supper in Group II.

Will the children be supplied with a quart of milk a day? A glass of milk at each meal, as we have provided in our menus, will go far toward using a quart a day. The milk that is combined with other

foods, such as the macaroni and cheese and in the puddings and sauces will add enough to make it easy to get a quart of this valuable food each day.

With regard to the season of the year, there are fewer calories in the menus suggested in Group II than in Group I. This would help to make the menus in Group II somewhat better suited for hot weather than those in Group I.

### **The Cost of Foods and a Balanced Diet:**

If we feel that we could not afford to spend the money it takes to buy all the different foods suggested in the daily menus on page 44, how can we get the right foods and also get the most for our money? The suggestions made by the Bureau of Home Economics of the United States Department of Agriculture will help us out of our difficulty. We are told, first of all, that the less money we have to spend for food, the more important it is for us to choose our foods carefully and to get the most for our money. Then we are advised to give the whole family:

#### *Every Day*

Bread and other grain foods, like cracked wheat, corn-meal mush, oatmeal, rice grits.  
Potatoes.

#### *Several Times a Week*

Tomatoes, raw cabbage, or raw fruit.  
Dried beans, peas, or peanuts.  
Some lean meat, poultry, eggs, fresh fish,

Milk: Fresh, evaporated, or dried.

canned salmon, or cheese.

One or more vegetables or fruits, especially vegetables of green or yellow color.

*Give Young Children*

Milk at every meal.

Molasses, sugar, other sweets.

Tomato or orange juice every day.

Butter, lard, fat meat, other fats.

Several eggs a week, if possible.

Plenty of water to drink.

Another way of helping us to spend our food money wisely is to divide it into several parts, and then use each part for certain kinds of foods we should have for proper health and growth. Food experts\* suggest that we divide the money into fifths, and then spend it as follows:

About one-fifth for vegetables and fruits.

About one-fifth, or more, for milk and cheese.

About one-fifth, or less, for eggs, meats, and fish.

About one-fifth, or more, for bread and cereals.

About one-fifth, or less, for fats, sugar, and other groceries.

For those who may like to know how much a week's supply of food should amount to for a family of five—a father, mother, and three children under

\*Miss Lucy Gillett, Dr. Henry C. Sherman, Dr. Mary Swartz Rose, and others.



fourteen years of age—the following lists have been prepared by the Bureau of Home Economics of the United States Department of Agriculture:

**Bread, flour, and other grain**

products .....	30 pounds
Milk .....	28 quarts
Potatoes .....	20 pounds
Dried beans or peas.....	1 pound
Tomatoes, fresh or canned.....	6 pounds
Leafy vegetables (greens) .....	10 pounds
Other vegetables and fruits.....	10 pounds
Butter, lard, bacon, and other fats....	3 pounds
Sugar, molasses, syrups.....	3 pounds
Lean meat, fish, cheese.....	7 pounds
Eggs .....	1 dozen

It is also important to know that the same food values can often be obtained from less expensive forms of foods. For example, oatmeal and cracked wheat are quite as wholesome and less expensive than some of the more refined, fancy, prepared breakfast foods. Cheaper kinds and cuts of meats, such as beef, pork, or lamb liver, chuck, flank, and neck of beef, or breast of lamb are quite as useful for body building as the more expensive chops and roasts.

### **The School Lunch:**

Many schools have lunch rooms in which whole-

some, nourishing foods can be purchased. Where care is given to the preparation of the daily menus so that they will suit the needs of growing children, it is possible to select a lunch that will be somewhat similar to the lunch in Sample Menu I, on page 44. This will provide a cooked food, milk, bread, and dessert. Bread is also offered in sandwich form, with meat, cheese, or other tasty fillings. Candy should be eaten at the close of meals, not between them.

When the lunch is carried to school, the box or basket lunch should be one of the regular meals for the day and not something merely to satisfy the appetite until the evening meal. Milk can be carried in a thermos bottle and should be included in the daily lunch. Sandwiches can be made with many different kinds of nourishing and tasty fillings, including butter, peanut butter, cheese, eggs (hard boiled and sliced, rather than fried), jams and jellies, sliced or chopped meats, and chopped raisins, nuts, or figs. In order to give another kind of variety to the sandwiches, different kinds of bread may be used, such as white, whole wheat, graham, rye, raisin, or nut bread.

Fruits form convenient and healthful desserts. Cookies, plain cakes, and puddings will furnish the sweets that help to give a finishing touch to the lunch and leave a satisfied feeling at the end. Candy should be eaten at the close of meals, not before or between them. (For additional suggestions for bas-

ket or box lunches prepared at home and carried to school, see Section B, page 303.)

## THINGS TO DO AND THINK ABOUT

### A. For Answer and Discussion:

1. What are the three principal needs of the body for food? What comparisons can be made between our bodies and an automobile with regard to these needs?

2. Name some good muscle-building foods. What is another name for these foods?

3. What mineral substances are needed for building good bones and teeth? Name some of the most useful foods supplying the body with these substances.

4. We should supply the body with enough fuel foods to keep it from using good body-building foods for the production of heat and energy. What three groups of foods are excellent fuels for the body? Name some foods in each group.

5. Tell something about the importance of the vitamins? Name some of the best foods for supplying the body with vitamin A; vitamin B; vitamin C; vitamin D. In what other ways than by eating foods can we obtain vitamin D?

6. Tell what is meant by a balanced diet. Name the different food substances that are needed in order to provide the body with a balanced diet.

7. Discuss the importance of eating a variety of different foods in order to obtain a balanced diet.

8. Why is milk called the almost perfect food? What are some of the foods that will help to make up for the iron and other substances that are somewhat lacking in milk?

9. Why do bread and milk together make such an excellent combination of foods?

10. About how much milk is recommended for a child to have each day? In what ways can this be taken?

11. What are some of the differences in food values between whole milk and skim milk?

12. Discuss the meaning of the slogan, "Eat what you want, after you have eaten what you should."

13. What is meant by a "low-cost" diet? What suggestions are made for choosing foods for a low-cost diet?

14. Name some suitable foods for a good school lunch.

15. Why should the number of calories be kept in mind when planning a day's meals?

16. What is the value of water in the diet?

17. Name some foods that supply water to the body.

## **B. For the Health Notebook and Bulletin Board:**

1. Make lists of foods according to their principal uses to the body. Some foods will be placed in more than one list. Headings for these lists might be made as follows:

THE FOODS WE EAT				
BODY-BUILDING		FUELS		PROTECTING AND REGULATING
Muscles	Bones and Teeth	Starches and Sugars	Fats and Oils	

## 2. A Vegetable and Fruit Calendar:

Divide a large sheet of paper or a double page in your notebook into twelve columns, one for each month of the year. Write in each column the names of the vegetables and fruits that ripen in that month in your community. Vegetables and fruits are usually cheapest and have the best quality when they are in season.

In another part of the column, you could list the principal vegetables and fruits that are brought to your stores from other parts of the world. Cut-out pictures of vegetables may be added to make the calendar more attractive.

## 3. "Three Meals a Day":

Keep a record of the foods you eat at each meal for several days. Compare them with the suggested menus on page 44. After this discussion, plan a suitable breakfast, lunch, and dinner. This can be written down on paper, or it can be shown in illustrated form by pasting cut-out pictures of the foods you choose, or sketches or drawings of them, on a poster.

4. Arrange a page or two for keeping the records



of your height and weight, as measured throughout the year.

### C. A Vocabulary Test:

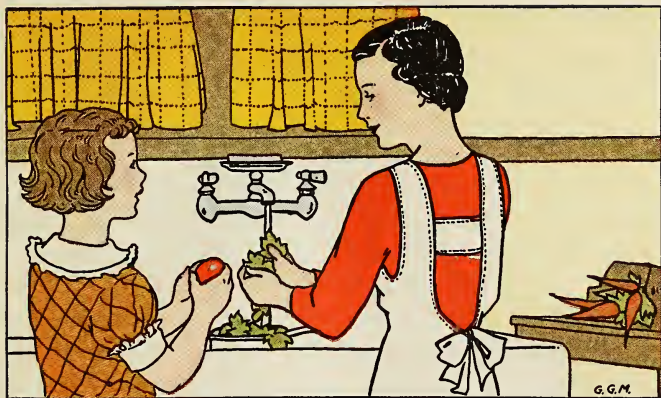
There are a number of special words we have to use in talking about foods and our health. A few of these are given in the following matching test. The words are given in Column I. Find the statement in the second column that most accurately describes the meaning of the word in connection with foods and health. Do not write anything in this book. Give your answer aloud or write the word and its meaning on a separate piece of paper.

#### *Column I*

1. diet
2. calcium
3. cells
4. vitamins
5. menu
6. proteins
7. iron
8. roughage
9. carbohydrates
10. calory

#### *Column II*

- (a) food fuels for the body
- (b) muscle-building substances found in foods
- (c) the foods you eat
- (d) mineral substance needed by the body
- (e) bulky parts of foods
- (f) a unit for measuring heat
- (g) protective substances found in foods
- (h) a list of foods
- (i) building units of the body



### **WASH FOODS CAREFULLY**

*The dust in the air spreads bacteria and germs.*

## **CARING PROPERLY FOR FOODS**

Once in a while we have to throw away some food that has spoiled. It may be a jar of canned fruit that has turned sour, some moldy bread, or a few rotted potatoes. It is wasteful to throw things away, but in these cases it is a wise thing to do because the foods have become unwholesome, or unfit to eat.

Before the invention of the microscope, people did not know why foods spoiled. It was a very mysterious thing to them. Today we know that bacteria and other tiny forms of life cause these changes in foods and make them unsafe to eat. There are some very useful things that can be done to prevent this waste of food and protect our health.

### **A Safety Chain:**

Foods should be kept clean and wholesome in order to protect our health and make them more enjoyable to eat. The work of doing this may remind us of a chain. At one end of the chain is the food as it is first produced at farm or garden. At the other end is the food as it enters our bodies. Between the ends are a number of links, each representing some care that is taken or some problem that must be solved in order to keep our foods clean and wholesome at all times. Remember that a chain is no stronger than its weakest link. With some foods the number of links in this safety chain will be small, as in the case of ripe fruits and garden vegetables that are picked and used at once. In other cases there will be many links in the safety chain, for some foods are transported long distances and are handled by many different persons or pass through a number of changes in a factory or manufacturing plant before reaching our table. Milk is a good example of a food that has many links in its safety chain. As described on pages 12-13, it needs especial care at every part of its journey from the time it is obtained from the cow until it enters the body.

### **Keep Foods Clean:**

Foods should be kept free from dust and dirt, and away from flies, insects, and animals. This helps

to prevent disease germs from getting into our foods. It is easier to keep foods clean today by the use of dust-proof and often air-tight packages and cartons.

Persons who handle foods should keep themselves clean, so that they will not soil the food they touch. The buildings in which foods are prepared for sale should also be kept spotlessly clean. In some places machines do all the work. The carefully wrapped foods come to us, as the advertisements say, "Not touched by human hands." Why is this an advantage?

Foods should be prepared for the table in ways that keep them clean and safe to eat. Fruits and vegetables should be thoroughly washed. Clean dishes and utensils should be used. The kitchen should be the cleanest room in the house.

### **Why Foods Spoil:**

The tiny world of plants and animals called bacteria have a great many useful purposes. They cause bread to rise, cider to turn to vinegar, and fallen trees and other useless materials to decay or rot. When they get into our foods and spoil them, they are doing their work in the wrong places.

There are three principal kinds of these tiny forms of life that spoil our food. They are called the *yeasts*, *molds*, and *bacteria*.

*Yeasts.* The tiny yeast plants are useful in a

number of ways. When they are mixed with bread dough and kept in a warm place, they feed upon the sugar in the dough. As the yeast plants grow, they produce a gas called carbon dioxide. This gas causes the bread to rise and helps to make it light and airy and much more pleasant to eat. When yeast plants grow in a jar of canned fruit, they cause it to turn sour and make it unfit for food. In fruit juices they produce alcohol, turning the sweet, wholesome juice into wine or cider.

*Molds.* Molds are fine, thread-like plants. When large masses of these tiny plants grow on a piece of bread or the top of a glass of jelly or jam, the mold is easily seen without the help of a microscope. It appears as a reddish or grayish-green forest of tiny threads. Molds grow from tiny spores (seeds) which blow about in the air and get into our foods. They grow best where it is moist, warm, and dark. Molds are useful in making certain kinds of cheese. When they grow in the wrong places, they spoil our food for us.

*Bacteria.* Bacteria are tiny forms of life that are found in the air, water, and soil. They are so small they cannot be seen without the help of a powerful microscope. Like the yeasts and molds, they grow best in moist, warm, dark places. Most kinds of bacteria are harmless to our health, but there are some others that are our dangerous enemies. These are the disease germs that are described in Unit IV.

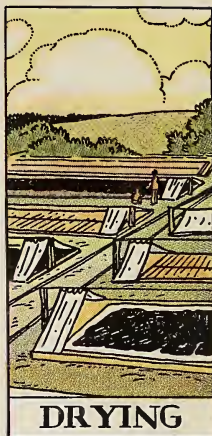


Many kinds of bacteria serve a useful place in the world. They change cider to vinegar, help to make certain kinds of cheese, and are valuable in giving a flavor to butter. Bacteria which live in the ground cause waste leaves, plants, and animal matter to decay. This helps to get rid of dead and useless material, and enriches the soil. The bacteria which grow in food will cause it to rot, or decay, and spoil it for our use. Instead of aids or helpers, they become great nuisances. Care must be taken to prevent their harmful and destructive work.

### **Preservation and Care of Foods:**

The problem of keeping foods from spoiling has troubled human beings for thousands of years. The heat of the sun was used by the ancient Greeks and Romans to dry some of their foods in order to keep them safe to eat. The American Indians dried their buffalo meat to keep it through the winter. Drying is still used today as a method of keeping foods from spoiling. Raisins and prunes are dried forms of fruits. Fish is sometimes dried to preserve it. Salting, smoking, and spicing are other methods that have been used in ancient times and are still used to preserve foods.

The conditions which favor the growth of yeasts, molds, and bacteria are moisture, warmth, and darkness. This knowledge is a great help in controlling these tiny forms of life and preventing them

**COLD****CANNING****DRYING**

*Three useful ways of keeping foods from spoiling.*

from spoiling our foods. The reason that dried foods do not spoil is because of the very small amount of moisture in them. Dried fruits will spoil, however, when they are soaked in water unless care is taken to prevent it.

*Cold* helps to keep foods from spoiling. Yeasts, molds, and bacteria are not killed by cold, but they are prevented from growing. Cold is the usual method of keeping fresh meats and milk from spoiling. The use of ice and electric refrigeration has made it possible to ship fresh meats, fruits, and vegetables long distances. Cold storage plants make it possible to keep fresh foods in good condition for a long time.

In the home meats, milk, and many other kinds of foods should be placed in the ice box or refrigerator to keep them from spoiling. When canned foods are opened, any part that is not used at once should be taken from the can and kept in a cool place. Bacteria or molds that float about in the air get into foods after the cans are opened and cause them to spoil unless care is taken to prevent it.

The *canning* of foods makes it possible for us to enjoy foods long after the growing season is over. Meats, fish, fruits, and vegetables are preserved in cans. Great quantities of milk are canned and sold in evaporated or condensed forms.

Modern ways of canning help to preserve the vitamins and other important food values. After the cans are filled and tightly sealed, they are usually sterilized by heating until all bacteria in them are killed. This makes it possible to keep the foods in them safe and wholesome for a long time. There is so much care taken to make canned foods safe to eat that there is little danger from their use. If you notice the ends of the cans, you will ordinarily find them rounded slightly inwards. The food in such cans is safe to eat. If the ends of the cans should be rounded outwards, the food inside them is very likely to be spoiled and unfit to eat. The gas which forms as the bacteria grow causes the ends of the cans to press outwards. Do not eat food from such cans.

The problem of keeping foods clean and wholesome is so important that government health officers inspect places where food is prepared and sold. The workers in these places are examined to see that they are free from diseases which might be spread by the food they handle. There are a number of Pure Food Laws which help to protect us against improper foods.

### **Keep Foods Clean in the Home:**

In the home each one should take care to keep foods clean and wholesome at all times. Foods should be protected from flies, because these insects carry dirt and disease germs from place to place. Keep the house well screened and kill all flies that get inside. Always keep garbage pails covered and do not allow rubbish to collect in the yard. These form places for flies to grow. On farms the manure pile is a breeding place for flies unless care is taken to prevent it.

Protect foods from roaches, rats, and mice. One of the best ways to keep these insects and animals out of the house is to keep the kitchen and cellar clean. Do not allow bits of food to remain where they can be eaten by them. Many kinds of foods can be stored in covered tins to keep insects and animals away from them.

Keep the ice box or refrigerator clean. Wash it frequently with warm water and soap, ammonia, or

other suitable substances. Foods with odors which might be absorbed by other foods should be kept covered in the ice box. Keep milk in the coolest part of the ice box or refrigerator. This will be next to the ice or directly under it. In an electric refrigerator, keep it close to the ice-making part. Always keep milk covered.

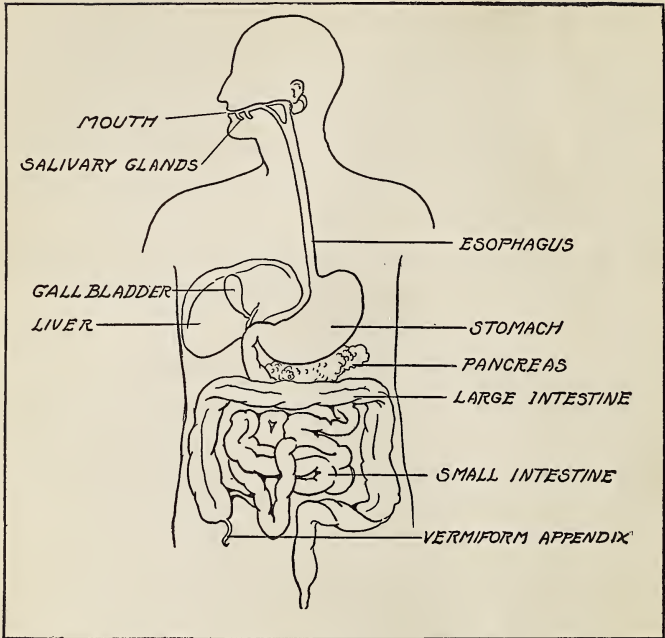
## SOME AIDS TO THE DIGESTION OF FOODS AND THE ELIMINATION OF WASTE MATERIALS

### Foods Are Changed by Digestion

If you chew an unsweetened cracker for a while you will notice a sweetish taste in your mouth. There is a very good reason for this, for some of the starch in the cracker has actually been changed into sugar.

Food cannot be used for growth and repair or heat and energy in the forms in which it is eaten. It must first be changed into forms which can be used by the body to meet its needs. These important changes take place during the process of *digestion*.

The digestion of our foods takes place in a part of the body called the alimentary canal. This canal is a continuous tube. It begins at the *mouth* and narrows to form the *esophagus*, or tube, which leads into the *stomach*. The stomach is a bag-like organ which receives the food which is swallowed. From



### THE ALIMENTARY CANAL

the stomach, the food passes into the *small intestine*. This is a long, narrow tube which lies coiled up in the abdomen in such a way that a large amount may be contained in a small space. The small intestine is connected with the *large intestine*, through which the waste materials of digestion are sent out of the body. The diagram above shows the location



within the body of the different parts of the alimentary canal.

### **The Digestive Juices:**

Food is moved along the alimentary canal by the action of muscles which form a part of its walls. At certain places in the course of this journey the food becomes mixed with the *digestive juices*. These digestive juices are watery liquids which have the power of changing foods into forms which can be used by the body to meet its needs.

### **Digestion in the Mouth:**

When food is chewed by the teeth and rolled around by the tongue, it becomes mixed with *saliva*. Saliva is a digestive juice which contains a special substance that changes some of the starch in our foods into sugar. Starches are important fuel foods, but they must be turned into a form of sugar before the body can use them to produce the heat and energy the body needs. Thus the process of digestion begins in the mouth. Saliva also softens and moistens food so that it can be swallowed more easily.

### **How Food Is Swallowed:**

The swallowing of food is controlled by the muscles of the *esophagus*, or tube, which leads from the mouth to the stomach. Liquid foods pass rapidly through the *esophagus*. Foods not in liquid form

are moved along by the muscles in the walls of this tube. After the swallowing is once started, it is no longer under our control.

The action of the muscles in swallowing can be clearly observed in some animals. Watch a horse drink. Note that the muscles of the esophagus actually push the water uphill in its passage into the stomach. Perhaps also you have seen acrobats eat or drink while hanging head downwards. The swallowing is due to the action of muscles in the esophagus.

*How Food Is Kept Out of the Air Passages to the Lungs:* The mouth is the gateway through which both food and air enter the body. The food passes from the mouth into the esophagus and thence to the stomach. The air passes into the trachea, or windpipe, and on to the lungs. In order to keep food out of the air passages, the windpipe is provided with a little lid, or kind of trapdoor. This lid is open to allow the passage of air, but automatically closes when food is swallowed.

This little door closes promptly when we eat slowly, chew our food thoroughly, and do not become too excited when swallowing. Once in a while when we swallow too quickly or become too excited about something, small particles of food may get past the trapdoor into the windpipe. The violent coughing which takes place when this happens usually forces out the food. It is a very unpleasant experience.

## Digestion in the Stomach:

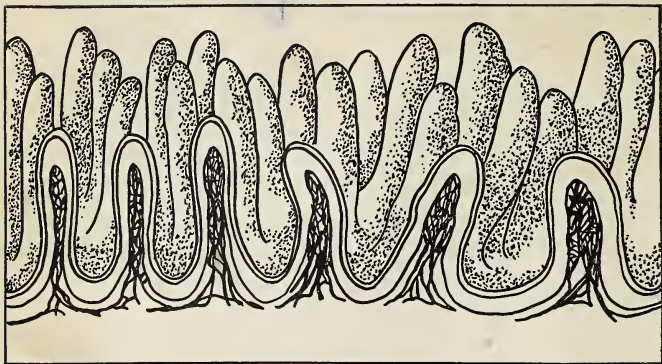
The stomach is a part of the alimentary canal which has become enlarged into a bag-like pouch. There are two openings in the stomach. One is connected with the esophagus, through which food enters the stomach. The other opening leads into the small intestine. Circular muscles at these openings regulate the passage of food through them. Their actions are not under our voluntary control.

The stomach acts as a storehouse for food which has been swallowed and is ready for digestion. At the same time, the stomach begins the digestion of the protein parts of food.

The digestion of proteins in the stomach is due to the work of the *gastric juice*. While in the stomach, the food is constantly moved about in a kind of churning motion by the contraction of muscles in its walls. This mixes the food with the gastric juice. At the same time the water in the stomach softens and dissolves many parts of the food. Thus, by the time the food is ready to be passed on into the small intestine, it is a much thinner and more creamy liquid than when it entered the stomach.

## Digestion in the Small Intestine:

The small intestine is a long tube which lies coiled up in the abdomen. Several digestive juices are poured into the small intestine. These are known as the pancreatic juice, bile, and intestinal juice. These



*Villi in the small intestine carry the digested food into the blood.*

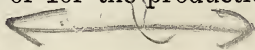
juices complete the digestion of the starches and proteins, and also digest the fats and oils. Muscles in the walls of the small intestine help to move the food along, mix it with the digestive juices, and aid in its absorption.

### **Absorption in the Small Intestine:**

In order to be used for growth and repair and heat and energy, the digested food materials must be taken to the different parts of the body where they are needed. This distribution is the work of the blood. The process by which these food materials get into the blood is called *absorption*.

Most of the absorption of digested food materials takes place in the small intestine. The inside of the small intestine is covered with large numbers of

hair-like tubes, called *villi*. See illustration on page 68. As the thin, liquid food in the small intestine is moved about, it touches these villi. When this occurs, the digested food materials pass right through the thin walls of the tiny blood vessels in the villi. The food is carried along in the blood, passes through the liver, and when it reaches the heart, it is pumped, or sent out on its journey around the body. In this way, the digested food materials reach the parts of the body that need them for growth and repair of tissues, or for the production of heat and energy.



### **The Work of the Large Intestine:**

The alimentary canal continues from the small intestine into the large intestine. The large intestine receives its name from the fact that it is bigger or wider than the small intestine. It is only about six to eight feet in length, whereas the small intestine is about twenty feet long.

The large intestine receives the undigested and unabsorbed parts of the food from the small intestine. When this material enters the large intestine, it is in a thin, watery condition. A large part of this water is soon absorbed by the blood so that it will not be lost to the body. Small portions of digested food that may have escaped being taken up by the blood in the small intestine are also absorbed here. The material which is left, collects in

the large intestine, and is eliminated, or sent out of the body in the movements of the bowels. →

## **SOME USEFUL AIDS TO DIGESTION**

Digestion ordinarily goes on without any thought or attention from us. About the only time we know we have a stomach is when something goes wrong and we have indigestion or other kind of trouble with our digestion. It is one of the signs of good health when the stomach and other organs of the body go ahead with their work without needing our conscious attention or direction.

There are some things, however, that we all can do to aid digestion and keep it in good order.

### **Proper Cooking Aids Digestion:**

Foods are cooked by using heat in some way to prepare them for our use. Cooking softens and loosens the connective tissue of meats and the fibers of vegetables. This makes them easier to chew and helps the digestive juices to get at their nourishing parts. Starch grains in starchy foods are also softened by the heat and moisture of cooking. This is a very useful preparation for their digestion.

### **Cooking Kills Bacteria in Food:**

Disease germs are sometimes spread from place to place by foods. These germs may get into foods as a result of some carelessness in their preparation or in handling them afterwards. Heat will destroy



disease germs if the cooking is kept up long enough. In a general way, a half hour's cooking will make most foods safe from germs. Some of the meats, especially pork, require a longer time to kill disease germs which are sometimes found in these foods.

### **Cooking Improves the Flavor of Many Foods:**

Some foods have their flavor improved when they are cooked. Foods that we would not enjoy in their raw state taste very good to us after they are cooked. This helps to increase the number of different kinds of foods we eat and adds variety to our diet. ✓

### **Methods of Cooking:**

There are a number of different ways of cooking foods. The most common are boiling, baking or roasting, broiling, steaming, and frying. Certain foods taste best when prepared in certain ways. Many foods may be prepared in several different ways. Potatoes, for example, may be boiled, baked, or fried. Meats also may be cooked in a number of different ways. A change in the method of cooking helps to give a variety to the diet and keeps us from becoming tired of some of our valuable foods.

Foods should be cooked in ways that help to preserve the greatest amount of their food values and that aid in their digestion. A large amount of the vitamin content of vegetables can be destroyed by

too much cooking. Boiling too long will help to dissolve a part of the valuable mineral content of these foods. In order to preserve the greatest amount of the food value of vegetables, it is suggested that they be steamed or baked. When vegetables are boiled, it is recommended that we use as little water as possible and not to cook them too long. Cook only until they are tender enough to eat. The water in which a vegetable is cooked can be used for making a sauce for it or saved to use in a soup. In this way the valuable minerals which have dissolved into the water are not lost.

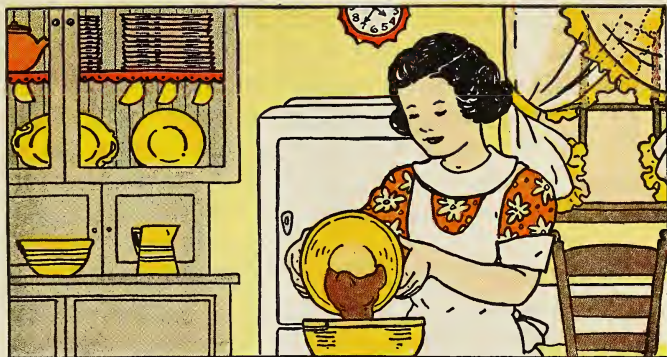
Of all the methods of cooking, frying is the least desirable. In the process of frying, the foods absorb, or take up, some of the fat which is used. This makes them harder to digest.

### **Some Foods Not Cooked:**

A number of foods are eaten without being cooked. Many fruits are eaten raw. A number of uncooked leafy vegetables can be enjoyed in the form of salads. When we eat raw fruits and vegetables we are sure of getting their full vitamin content. We cannot be certain of this after they are cooked. Wash foods thoroughly before eating them raw.

### **Cleanliness in Cooking:**

Care should be taken to keep foods clean during their preparation for the table. This will help to



*To keep foods clean in the home: a clean kitchen—clean hands—clean clothes—clean dishes and utensils.*

prevent dirt and disease germs from getting into the body. Let as much fresh air and sunlight into the kitchen as possible. Sunlight is a good disinfectant and is valuable for killing germs. Be sure to keep the pans and other utensils clean.

### **Use of Seasonings in Food:**

The use of seasonings, such as salt, pepper, vinegar, and catsup, makes it possible to prepare foods to suit a wide variety of tastes. Salt has a food value, while others, such as pepper and the spices, have practically none. The body needs a certain amount of salt to keep it healthy. The use of a little of the other seasonings now and then that add to the enjoyment of foods is a better practice than the development of actual dislikes for food that is served

without seasonings. A danger in connection with the use of seasonings is that we are very likely to keep increasing the amount as we become accustomed to them. Such excessive use of seasonings is often followed by irritation of the delicate linings of the digestive organs and a dulling of the appetite for any but the very highly seasoned foods.

### **Prepare and Serve Foods Attractively:**

The appearance of foods, the way they are cooked, and the surroundings in which they are eaten can add to or take away from the enjoyment of our meals. A liking for all good, wholesome foods is easy to form when they are nicely prepared and attractively served.

### **Other Aids to Digestion:**

There are a number of other helpful aids to digestion which can be described briefly as follows:

1. Select foods wisely; eat moderately. Do not overload the stomach with too much food or with food that is hard to digest.

2. Chew foods thoroughly. Allow plenty of time to eat your meals so that foods can be thoroughly chewed. This is a helpful preparation for their digestion. In order to chew our foods well, we need good teeth. The proper care of these important tools for chewing will be described later in this unit, on pages 93-100.

3. Drink enough water to furnish all that is needed for digestion. A glass of water before and after a meal or with the meal will provide the stomach with the liquid it needs for softening and dissolving foods.

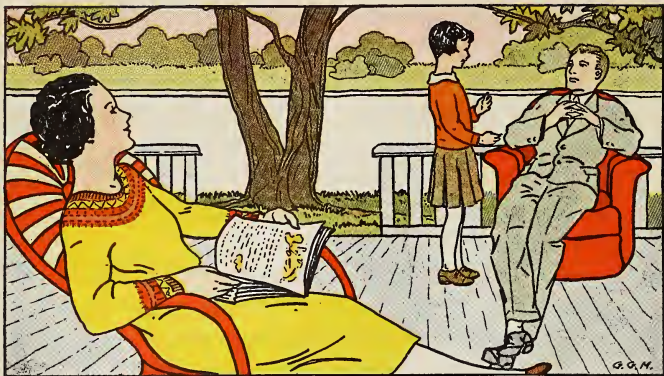
Drinking water with meals is not considered harmful unless taken in excessive amounts or used to wash down the foods.

4. Be cheerful and mannerly at mealtime. Mealtime should be one of the most cheerful parts of the day. The table is not the place to talk over the troubles and cares of the day. It has been shown by experiment that digestion is disturbed by worry, nervousness, grief, fear, and other expressions of our feelings. Things which help to make mealtimes interesting, pleasant, and enjoyable, are aids to digestion. Prepare appetizing, or attractive meals. Make the dining room and dining table attractive. Serve meals at regular times.

Many opportunities occur at the table to show courtesy and consideration to others. It is expected that you will offer to serve others before helping yourself, and that you will cheerfully share the food with others. Do not reach across the table. Ask to have foods passed to you.

5. Rest quietly for a short time before and after meals. This will give the digestive or-





*Rest before and after meals is an aid to digestion.*

gans an opportunity to begin their work without being disturbed by other things.

6. *Avoid the use of alcoholic drinks.* With some drinkers even a moderate amount of alcohol taken into the stomach interferes with digestion of food. Strong alcoholic liquor or large amounts of weaker drinks inflame the delicate lining of the stomach. If this irritation is very severe, it will cause vomiting. The steady use of alcohol may cause a continually inflamed condition of the stomach. This may impair health because the injured stomach does not act properly in the digestion of food.

*Alcohol is not a food.* It is not changed by the process of digestion. A few minutes after



it enters the stomach, it begins to be absorbed and to circulate in the blood around the body. Alcohol may add some heat to the body's general store of warmth. Alcohol, however, cannot be used by the body for the growth and repair of tissues. It cannot be stored up for reserve strength and energy like the fuel the body gets from proper foods. Thus, alcohol is not a real food for the body. The harmful effects of alcohol upon the body make it a very *undesirable* source of the heat and energy that it can provide.

### **The Liver:**

The liver is the largest organ in the body, weighing from about three to four pounds. It is located in the abdomen and has several uses connected closely with digestion.

The liver receives an abundant supply of blood. A large amount of this is blood which contains waste materials which have been collected from other parts of the body. It is one of the duties of the liver to remove some of these waste materials and make them ready for elimination.

The blood from the small intestine with its rich supply of digested food materials passes through the liver before it is pumped around the body by the heart. The cells of the liver act upon the sugar which has been absorbed and change it into a form best suited for producing heat and energy. The liver acts

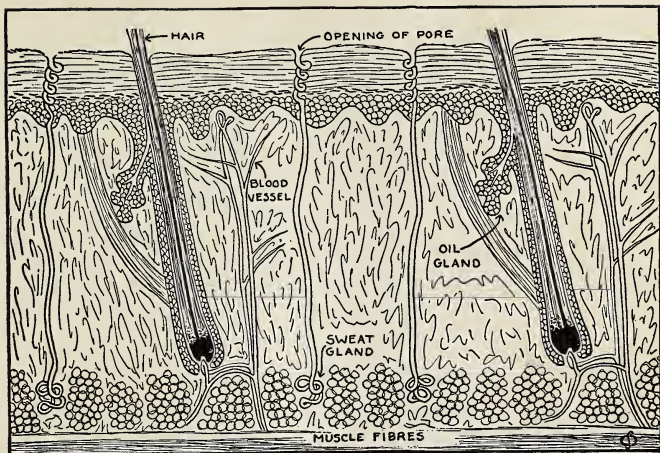
as a check upon the distribution of this sugar throughout the body. Whenever there is more sugar absorbed than is needed by the tissues at the time, the liver removes the extra amount from the blood, and stores it up within itself. Later, when the body has a need for this fuel, it is released and used for the production of heat and energy.

The liver also secretes the bile. This is a digestive juice which is poured into the small intestine and aids in the digestion of the fats and oils.

Alcohol can do very serious damage to the liver. It frequently produces irritation and inflammation of the liver cells. The continued and immoderate use of alcohol often injures these cells and interferes with their important duties. A diseased condition of the liver is often found in habitual heavy drinkers.

## THE WASTE MATERIALS OF THE BODY

The undigested foods that collect in the large intestine form only a part of the waste materials of the body. Other kinds of waste materials are formed wherever the body uses up fuel and oxygen to produce the heat and energy we need. This using of fuel and oxygen and the production of heat and energy goes on continually inside our bodies, awake or asleep, as long as life exists. These waste materials are gathered up by the blood and carried to the proper places in the body for their elimination. They must be removed from the body regularly in



*A cross-section of the skin, as seen under a microscope.*

order to protect our health. These waste materials form harmful poisons when they remain too long inside the body.

The work of removing waste materials is divided up among several organs of excretion. The parts of the body that aid in this work include the skin, lungs, kidneys, and large intestine.

### **The Work of the Skin Is Important:**

The skin helps the body to get rid of some of its waste materials. The skin consists of two layers, as shown in the drawing above. The outer layer is made up of flattened cells. It contains no blood ves-

sels or nerves and is useful in protecting the body from harm. The inner layer is directly beneath the outer one. This inner layer contains a number of structures, which include nerves, blood vessels, sweat glands, oil glands, and the roots of the hair. When the inner layer of the skin is cut there is pain and bleeding.

The skin grows from the inside by the formation of new cells where the outer and inner layers are in contact. Tiny particles of dead skin fall off or are rubbed off the outer surface of the skin, and new cells are formed underneath to take their places.

The growth of new skin over a blister is an experience which is familiar to most of us. The injured part is very tender and sore at first. Little by little, the tenderness disappears as the protective outer layer is slowly replaced.

*Perspiration Contains Body Wastes:* It is the work of the sweat glands to produce perspiration, or sweat. This liquid is sent out of the body through tiny pores, or openings, in the skin.

Perspiration consists principally of water, together with some mineral salts and body wastes. Perspiration is being sent out of the body all the time. The total amount for a day is ordinarily about three to four pints. It usually evaporates, or disappears, into the air before it can form into drops. During hot weather and when you play or work hard, it forms so fast that it collects into drops.



### *EXERCISE AIDS ELIMINATION*

The elimination of waste materials through the skin is very necessary to our health and comfort. Do all you can to aid the skin in this work. Wash the entire body at least twice a week with warm water and soap to remove waste materials that are left when the moisture of the perspiration evaporates. This also helps to keep the pores open and free from dust and dirt.

### **The Lungs Aid in the Elimination of Body Wastes:**

The lungs help the body to get rid of a waste product called carbon dioxide. Carbon dioxide is a gas that is formed when oxygen and fuel are used up to produce heat and energy, as explained in Unit III, pages 149-151. As long as life exists, there is constant production of carbon dioxide. The blood brings this waste material to the lungs, and it passes out of the body in the air we breathe out.



The air we breathe out also contains some water vapor and other forms of body wastes. These will make indoor air impure unless fresh air is let into the room.

Exercise is useful in aiding the lungs in their work of eliminating body wastes. When you play or work hard, you breathe faster and deeper. This helps fresh air to get into all the air cells of the lungs and keeps them active. Proper posture makes it possible for us to breathe easily.

### **The Work of the Kidneys:**

Our kidneys, which consist of two bean-shaped bodies located in the back portion of the abdomen, are important organs of elimination. They remove certain kinds of body wastes from the blood and eliminate them in the form of urine.

The waste materials that form when protein foods are used up in the body are somewhat more difficult to remove than wastes from some other kinds of foods. They also become deadly poisons if they are not promptly eliminated, principally through the kidneys. For this reason, too much protein food should not be eaten. For example, when meat is eaten, too much other food that is also rich in protein should not be included in the same meal.

It helps the work of the kidneys to drink plenty of water. Form the habit of taking four to six glasses a day in addition to that taken with the



foods. Drink a glass of water when you get up in the morning and take the others at convenient times throughout the day.

### **The Large Intestine and Its Part in Elimination:**

Undigested and indigestible parts of our foods pass on from the small intestine into the large intestine. This part of the alimentary canal acts as a storage place for these waste materials until they are eliminated from the body in the movements of the bowels.

Regular bowel movements are an important aid to health. When these waste materials remain in the large intestine too long they form poisons which affect the health.

### **Some Helpful Aids to Elimination from the Large Intestine:**

The coarse, bulky, indigestible parts of some foods help to stimulate the muscles of the large intestine and thus aid the elimination of body wastes. These foods include: (1) Vegetables, such as spinach, cabbage, celery, rhubarb, and lettuce; (2) fruits, and their skins, when these are suitable to eat; (3) whole-grain cereals.

Drink plenty of water. A glass of water just after getting up in the morning is especially useful in aiding the elimination of body wastes from the large intestine.

Exercise is an important help. Active play, games,

and athletic sports aid in the elimination of these wastes.

Habit also plays an important part. Form the habit of going to the toilet at regular times, such as after breakfast in the morning.

*Prevention and Relief of Constipation:* The failure to remove body wastes from the intestines for several days at a time results in a condition called constipation. There are a number of simple remedies which will relieve this condition, temporarily, at least. Avoid the regular use of cathartics or drugs which are sold to aid in the elimination of body wastes from the large intestine, except upon the advice of a physician. In cases of constipation, it is desirable to get the muscles of the large intestine to perform their work in a natural way. The continued use of drugs is likely to weaken rather than strengthen the normal action of these muscles. When improvement in the elimination of wastes is needed, seek it through the natural means of exercise, proper foods, and regular habits.

## THINGS TO DO AND THINK ABOUT

### A. For Answer and Discussion:

1. Why is it important to keep foods clean and wholesome?
2. Name some ways by which disease germs can get into foods. How can these be prevented?
3. What causes foods to spoil? Describe some

of the ways by which the spoiling of foods can be prevented.

4. How can the appearance of a sealed can tell us something about whether the food inside is safe to eat or not?

5. Describe some precautions that should be taken in order to keep foods clean and wholesome in the home.

6. Describe the changes that take place when an unsweetened cracker is chewed.

7. What changes take place in foods in the stomach? In the small intestine?

8. Describe several ways by which we can aid the digestion of our foods.

9. Why is it important for the body to get rid of waste materials?

10. Tell briefly how the skin aids the body in getting rid of some of its waste materials. How can we aid the body in this important work?

11. In what way do the lungs aid the body in getting rid of waste materials? How can we aid the body in the work?

12. Describe the importance of the kidneys in the elimination of waste materials. How can we help the kidneys in their work?

13. What is the work of the large intestine in helping the body get rid of waste materials? Name several things that are useful in aiding the regular elimination of wastes from the large intestine.

14. Why is alcohol not considered a real food

for the body? In what ways can alcohol affect the stomach and the liver?

### **B. An Excursion:**

A visit to a market house, dairy, ice cream plant, bakery, or other place where foods are prepared and sold is helpful in learning about the care that needs to be taken of them at all times. The greatest help can be obtained from excursions where some of the things to look for are planned in advance. It is also helpful to take notes of the things you see while you are on the trip. A discussion after returning to class will help everyone to understand more about the importance of the things that have been seen.

### **C. For the Library Reference Table:**

"Care of Food in the Home." This is a fourteen page booklet published by the United States Department of Agriculture, as Farmers' Bulletin No. 1374, and which can be obtained at a cost of five cents from the Superintendent of Public Documents at Washington, D. C. The booklet gives information regarding the causes of the spoiling of foods, and suggests methods for keeping foods in good condition. Like most booklets of this kind, it is written principally for grown-ups, but there are a number of things in it which will be of use to younger persons. This booklet adds to the suggestions given in the text and helps everyone understand the importance of the proper care of foods at all times.

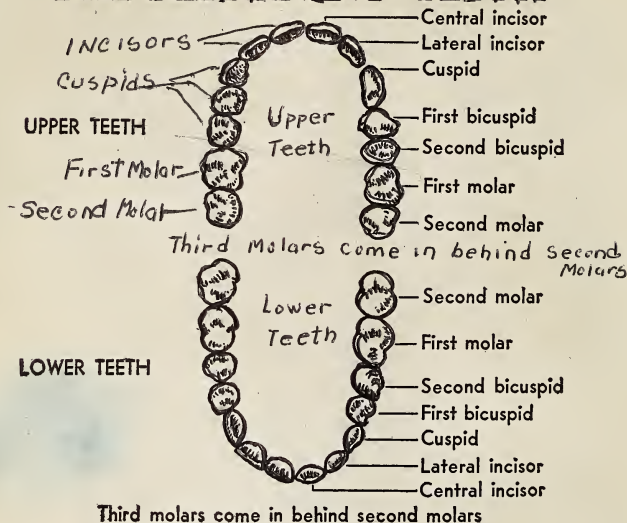


*CLEAN WHITE TEETH MAKE IT EASY TO SMILE*  
**OUR TOOLS FOR CHEWING**

In earlier grades the teeth have been referred to in different ways. They have been likened to pearls on account of their white, shiny appearance. Clean, white teeth improve our appearance and are pleasant to see. Dirty and stained teeth are unattractive looking and may be a drawback in making friends or getting ahead in business. Keep the teeth clean, white, and polished so that they will help you to look your best at all times. The teeth have been referred to as important tools of the body because they cut and grind our food and help to prepare it for digestion. The teeth also aid us in our speech. This is more plainly noticed when one or more front teeth are missing.



# THE PERMANENT TEETH

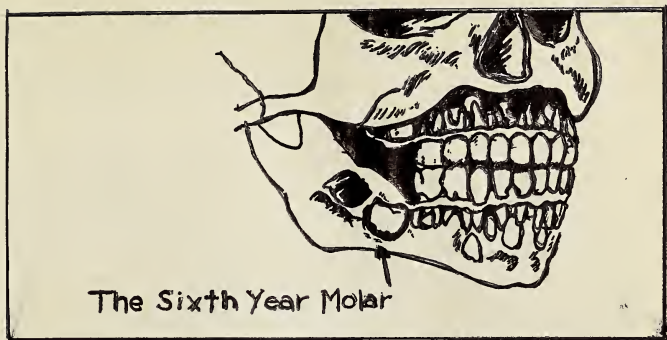


## Chew Foods Thoroughly:

When food is chewed it is cut and ground into small particles by the teeth. This is an important preparation for digestion. When foods are well chewed they become thoroughly mixed with the saliva, a digestive juice that is found in the mouth.

The front teeth have sharp, chisel-like edges, which are used for the biting of foods. The back teeth have broad, uneven tops. These teeth are used to crush and grind food between them. The drawings above show the location and names of the teeth.





### **TEMPORARY AND PERMANENT TEETH**

*The permanent teeth form underneath the gums. The ones that form under the temporary teeth push through and replace them. The others push through the gums when it is time for them to do so and take their proper places in the mouth. Note that the sixth-year molar is about ready to make its appearance. It does not replace any of the temporary teeth and should not be mistaken for one of the temporary teeth.*

### **Our Temporary and Permanent Teeth:**

A baby's first tooth is quite an event in a family. It pushes its way through the gum when the baby is about six months old and is usually one of the front teeth in the lower jaw. The first twenty teeth form a temporary set and have usually all appeared by the age of two or two and a half years.

These temporary teeth are replaced by a second or permanent set consisting of thirty-two teeth. While we have our temporary teeth, our jaws are growing larger, so that there will be room for all

the teeth in this second or permanent set. This is a very helpful thing because the teeth are quite fully formed when they are ready to push their way through the gums.

The first teeth to appear in the permanent set are the sixth-year molars. These get their name from the fact that they first appear when a child is about six years old. The sixth-year molar is the sixth tooth on each side of the middle line of the upper and lower jaws. The sixth-year molars do not replace any of the temporary teeth. They are often mistaken for the temporary teeth and do not get the special care they need. The sixth-year molars act somewhat like the keystone of an arch, helping to assist the other permanent teeth into their proper places in the jaws. An early loss of the sixth-year molars may allow the other teeth to come in so that they will not fit together properly. This will affect the biting of foods.

Other permanent teeth push through the gums from year to year until about twenty-eight teeth have made their appearance by the age of twelve or thirteen. The last four usually appear between the eighteenth and twenty-fifth years and are often called the wisdom teeth.

### **Good Foods for Good Teeth:**

Our teeth grow and develop underneath the gums for several years before they make their appearance



### GOOD SOURCES OF CALCIUM

*For building bones and teeth, and for other important uses in the body.*

in the mouth. The materials from which they are built are supplied to the body by foods.

The teeth are largely composed of a mineral substance called calcium, or lime. The best foods for supplying calcium to the body are milk and milk products, and the green, leafy vegetables, such as spinach, celery, cabbage, and cauliflower.

The teeth also need another mineral called phosphorus. Phosphorus is found in a large number of different foods. The most important foods for supplying the body with phosphorus include meats, fish, milk, cheese, eggs, dried peas and beans, whole-

grain cereals, spinach, and other leafy vegetables. Persons who eat a varied diet, such as that described on other pages of this unit, will keep the body plentifully supplied with phosphorus.

Vitamins are also necessary for building good, strong, sound teeth. Vitamin D is especially important. It has been found, for example, that calcium alone will not build good teeth. Some phosphorus is needed to join with the calcium. It has been found that the body makes the best use of both calcium and phosphorus when plenty of vitamin D is supplied to the body. Cod-liver oil and some other fish-liver oils are the best sources of vitamin D. Milk and eggs also furnish some to the body. Vitamin D can be produced right in our bodies by sunshine that is allowed to fall directly upon the skin.

Vitamin C helps to keep the gums and teeth in good condition. Foods that are good sources of vitamin C include the citrus fruits (oranges, lemons, grapefruit, and limes), tomatoes, and green leafy vegetables, such as spinach, turnip and beet greens, cabbage, and celery.

Vitamin A also aids growth and helps to keep the mouth and gums in a healthy condition. Foods that are valuable for supplying the body with plenty of vitamin A include whole milk and products made from it, green, leafy vegetables, such as spinach, lettuce, beet and turnip tops, and the yellow vegetables, such as carrots, squash, and sweet potatoes.

## PROPER CARE OF THE TEETH

Parents and children must share the work of building and keeping good teeth. In order to have good teeth, plenty of good tooth-building materials are needed from the very first year of life. The proper care of the teeth should begin when they first make their appearance through the gums. As boys and girls grow up, they should form good habits of brushing and cleaning the teeth, and protecting them from injury and decay.

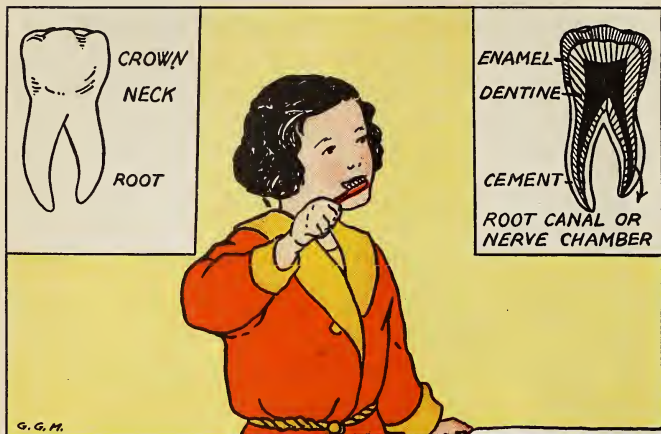
### How a Tooth Decays:

All teeth need to be protected against decay. Little particles of food that cling to the teeth or lodge between them form a starting point for decay.

*Importance of the Enamel:* The arrangement of the materials of which a tooth is composed helps to protect it against decay. The body or largest bulk of a tooth is composed of a white, ivory-white substance called *dentine*.

The part of a tooth that is outside the gums is covered with a thin layer of *enamel*. This enamel is the hardest substance in the body. It is brittle, however, and is likely to crack, or chip off, whenever things like hard candy or nuts are bitten. A good, strong, sound, well-formed layer of enamel will offer good resistance to decay, but unless the teeth are properly cared for, holes may occur in this extremely hard substance.

## PARTS AND STRUCTURE OF A TOOTH



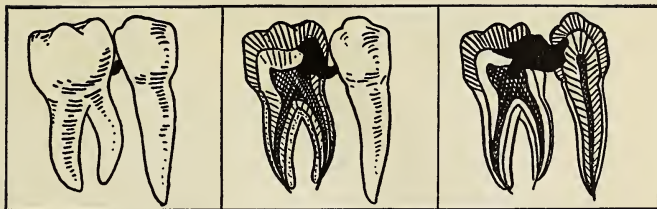
*Bedtime is one "time" to brush the teeth.*

The part of a tooth beneath the gums is covered with a thin layer of substance called *cementum*. This is not as hard as the enamel because it is not subjected to the work of biting and chewing.

Inside the dentine and extending down the center of each root is a hollowed out portion filled with a substance called *pulp*. The pulp contains the nerves and blood-vessels with which a tooth is supplied. When decay reaches the pulp, a toothache results.

*How Decay Begins:* Food that remains on a tooth forms a starting place for decay. This food makes a suitable place for germs to grow. Germs grow





*How decay will spread from tooth to tooth.*

best where it is warm, moist, and dark. As the inside of the mouth is warm, moist, and dark, the food that remains on the teeth becomes food for the germs. As the germs grow, acids are produced. These acids dissolve some of the calcium, or lime, that forms the tooth, and a hole is slowly eaten into the enamel. When the decay reaches the softer dentine, it becomes more rapid. By the time a toothache occurs, the decay has gone so far into the tooth that the nerves in the pulp are affected.

It is difficult to keep a tooth clean after it has started to decay. Pieces of food get into the decayed part and remain there even after the teeth are brushed. This is unfortunate because it often starts a hole in another tooth which may touch it at that place, as illustrated in the drawing above.

*Results of Decay:* If the decay in a tooth can be discovered in time, a dentist can usually fill the cavity and save the tooth for further use. Sometimes the decay has eaten so much of the tooth away that the tooth is lost.

Tooth troubles sometimes result in the formation of abscesses, or pus, at the roots of the teeth. If this pus forms quickly, it may become very painful and cause the face to swell. Sometimes the pus forms slowly and is absorbed into the body as it is produced. At such times, the person may not even know of the diseased condition at the root of the tooth. In these cases an X-ray is useful in discovering it. Abscesses at the roots of teeth have sometimes been found to be connected very closely with other serious troubles in the body, such as rheumatism and heart disease. This is a good reason for visiting a dentist at regular times. He can discover dangerous conditions before they do more harm to the body.

### **Brush and Clean the Teeth Regularly:**

Cleaning the teeth is a useful protection against decay. Brush the teeth *when you get up in the morning, after meals, and when you go to bed at night.*

In order to clean the teeth properly, use a suitable brush and materials. It is best to use a small toothbrush with fairly stiff bristles, like the one shown in the drawing on page 99. Have your own personal brush. Never use one that has been used by another person, nor allow anyone else to use your brush. A good tooth powder or paste is necessary for a thorough cleaning of the teeth. Use plenty of clean water when you brush the teeth. Use running water whenever you can get it.



*A good way to brush the teeth.*

Brush the teeth in the same way each time so that the different movements will soon be done from habit. Brush the outer and inner surfaces of the teeth in the upper jaw by sweeping the brush *down* over the gums and teeth. Brush these parts of the teeth in the lower jaw by sweeping the brush *upward* over them. You can do this best by rolling the handle of the brush in the proper direction, as shown in the drawing on page 99. Repeat these sweeping movements several times in one place before moving the brush on to the next group of teeth to be cleaned.

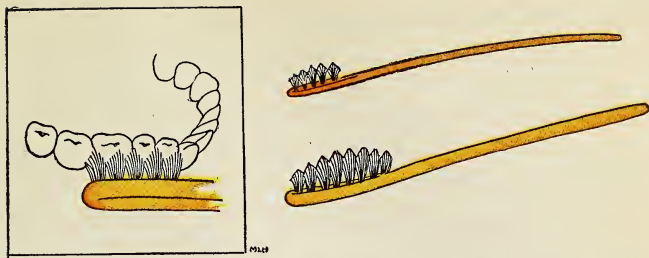
The chewing surfaces of the teeth have grooves and pits in them. Soft foods get into these hollows, or depressions, in the broad tops of these teeth. It is helpful to brush these parts of the teeth first before the brush becomes too soft. Use pressure on the brush and clean these chewing surfaces with a to-and-fro motion, rocking the bristles into these

pits and grooves. Do this with one or two teeth at a time, above and below, until you have thoroughly cleaned all the chewing surfaces.

When you clean the teeth, use a fast, but light stroke of the brush. You may have to use more pressure in the pits and grooves of the chewing surfaces in order to loosen the food that gets pressed down into these hollows. When you brush from the gums down onto the teeth, you massage, or stimulate, the gums and help to keep them in a healthy condition.

After you finish cleaning the teeth, wash the brush with cool, running water and place it where it can dry. Keep it in a clean place, on a toothbrush rack or standing up in a tumbler with the brush end upwards so it can dry. It is a good plan to keep two toothbrushes in use. First use one, and then the other. In this way, each brush has a better chance to dry out thoroughly, and kill germs that get on them.

A mouth wash is useful in removing bits of food which are loosened by the brushing. Warm water and salt and water, made by dissolving a teaspoonful of salt in a pint of water, are excellent mouth washes. Commercial mouth washes serve the same purposes, and are usually flavored so they leave a cool, pleasant taste in the mouth. Force the mouth wash back and forth between the teeth. Finish by rinsing the mouth with plain water.



*Choose a good brush—one that is small, fairly stiff, and with uneven bristles that will clean between the teeth.*

Dental floss should be used to loosen particles of food that are not removed by the brush. The thread should be forced gently between the points of the teeth that touch each other so it will not cut into the gums and make them bleed. Draw the thread back and forth slowly in order to make it pass these points. Rinse the mouth after using dental floss.

### **Exercise the Teeth and Gums:**

When we chew our foods, we exercise the teeth and gums. This exercise is necessary to develop properly shaped jaws and healthy gums and teeth.

In order to give the teeth and gums plenty of exercise, eat daily some food such as raw apples, raw carrots, celery, or cabbage, or hard, crisp toast or crackers. These foods require more chewing than softer foods. Chewing foods thoroughly aids digestion and gives needed exercise to the teeth and gums.

## **Make Regular Visits to a Dentist:**

Visit a dentist at least twice a year to have the teeth examined. Teeth sometimes have extra deep pits or grooves in them. These places are very hard to keep clean and form easy places for decay to get a start. The dentist can fill these and make it easier to keep the teeth clean and harder for decay to start.

A tooth does not ache until decay has eaten deep into it. Regular visits to a dentist will enable him to find tiny holes that may just have started to form. If discovered early enough, these can be filled without causing you any pain. In order to keep the teeth in the best possible condition, persons whose teeth are softer and decay easily should visit a dentist even oftener than twice a year.

When you make regular visits to a dentist, there will be times when your teeth will be found to be in perfect condition. This well repays you for the trouble it takes to keep them this way.

## **THINGS TO DO AND THINK ABOUT**

### **A. For Answer and Discussion:**

1. Why are the teeth often referred to as important tools of the body? What are some other uses of the teeth?

2. Of what use to us are the temporary teeth? Why is it so important to care properly for these temporary teeth?



3. What may be a harmful result of losing the sixth-year molars too soon?

4. What building materials and vitamins are needed for good teeth? Tell some of the best foods to furnish the body with each of them.

5. How may decay start in a tooth? How can it spread from one tooth to another? What are some of the results of the decay of the teeth?

6. Describe a good way to brush the teeth. What materials are needed? How often should the teeth be brushed in order to take the proper care of them? How does this compare with the care you take of your teeth? How may your care be improved?

7. What is the importance of enamel to a tooth? Why is the biting of very hard things harmful to the enamel and an aid to the decay of the tooth?

8. Give several reasons for visiting a dentist at regular times as part of your work of caring properly for your teeth.

### **B. Taking Out the Weak Links:**

“A chain is no stronger than its weakest link.” Under each numbered statement below are some statements with letters in front of them. Two of these lettered statements do not seem to belong under the numbered statement. Copy these statements on another piece of paper, omitting the statements that are the weak links in the chain. Do not write in this book.

1. Brush and clean the teeth:

(a) Before breakfast.

- (b) After each meal, if possible.
  - (c) After they begin to look dirty.
  - (d) Before going to bed.
  - (e) When some one tells you to do it.
  - (f) At least twice a day.
2. Aids to good, sound teeth:
- (a) Biting very hard things.
  - (b) Taking plenty of milk.
  - (c) Eating candy and other sweets.
  - (d) Regular brushing and cleaning.
  - (e) Regular visits to a dentist.
  - (f) Eating leafy vegetables.
3. Things closely connected with decay of teeth:
- (a) Lack of proper building-materials.
  - (b) Not using enough tooth paste.
  - (c) Neglect of proper cleaning.
  - (d) Insufficient chewing of foods.
  - (e) Failure to go to a dentist at regular times.

**C. Talks to the Class, or Items in a Health Newspaper:**

A Trip to the Dentist.

The Baby's First Tooth.

A Tooth that Came Out at an Embarrassing Time.

The Toothbrush Speaks to the Boys and Girls.

Pearls of Great Value.

"A Tiny Leak Can Sink a Ship," and

"A Tiny Hole Can Ruin a Tooth."



## UNIT II

### POSTURE AND HEALTH

“I think that I shall never see  
A poem lovely as a tree.”

These lines are from the poem “Trees” by Joyce Kilmer. It has been set to music and expresses very well our appreciation of the beauties and the usefulness of trees. A fine, tall, straight tree is a beautiful thing to see, whether it is in a park, in a forest, or on a lawn.

Young trees grow up, sometimes straight and tall, and sometimes bent and crooked. If a young tree starts to grow crooked, the gardener can make it straight again. He pulls the tree up straight and

ties it to a post or another tree. Held securely in this position, it grows correctly again.

The gardener knows that if a tree is held in the proper position long enough while it is young and growing, it will grow up straight and tall. The same is true of young and growing persons. If we hold our bodies in the proper standing and sitting positions when we are young, the bones and muscles will grow properly and correct posture will become a habit.

### **What Good Posture Will Do for Us:**

Proper posture permits bones to grow correctly. As the bones of young people bend more easily than those of older persons, proper posture is especially important when we are young and growing. Good posture makes it possible for the organs of the body to do their work properly. When we sit and stand correctly, the chest is held up. This allows a full amount of air to enter the lungs. It also helps the blood to circulate freely around the body and aids in the digestion of our food.

Posture also helps to show the character of a person. People who are successful usually show it in their posture. An erect, manly position increases the respect that others have for you. It will also strengthen your self-respect and the confidence you have in yourself. Well-trained soldiers do not hold themselves erect just to look well when they stand

or walk. They know that proper posture is important for good health. They also know that proper posture increases the respect that other people have for them. These are valuable things for all of us.

Good posture adds strength to the body. Proper posture in running will help you run faster. When you stand or walk properly, the body seems to have more strength. The muscles feel ready for anything that they have to do. Thus proper posture puts the body in readiness for work that is to be done. In games, athletic sports, and many forms of work there is an ease of position that makes the muscles work better. Watch trained athletes at work and notice the positions they take to do their best performance.

## PROPER POSTURES

In order to judge your own postures or those of others, you must know good positions when you see them. The proper standing, sitting, and walking positions described below are illustrated in the drawing on page 106.

### Good Standing Position:

A good standing position should give the appearance of vigor and ease. It should not look as if the muscles were being strained in order to hold the body in the proper position.

When you stand tall, or erect:





### GOOD POSTURES

*Good posture aids good health.  
Good health makes good posture easier.*

Hold the chest up, shoulders back, chin in, stomach in.

Keep the heels close together, with toes pointed straight forward, and the weight of the body carried slightly forward on the balls, or arches, of the feet.

Let the arms hang in a natural position at the sides.

Stand tall without strain.

If you have to stand very long in one position, it will relieve the muscles to shift the weight occasion-



ally from one foot to the other. When you are rested, return to the proper standing position as soon as possible.

### **Proper Sitting Position:**

In order to have a good sitting position:

Sit with body erect.

Sit well back in the seat so that the bones of the upper legs support the weight of the body all along their length.

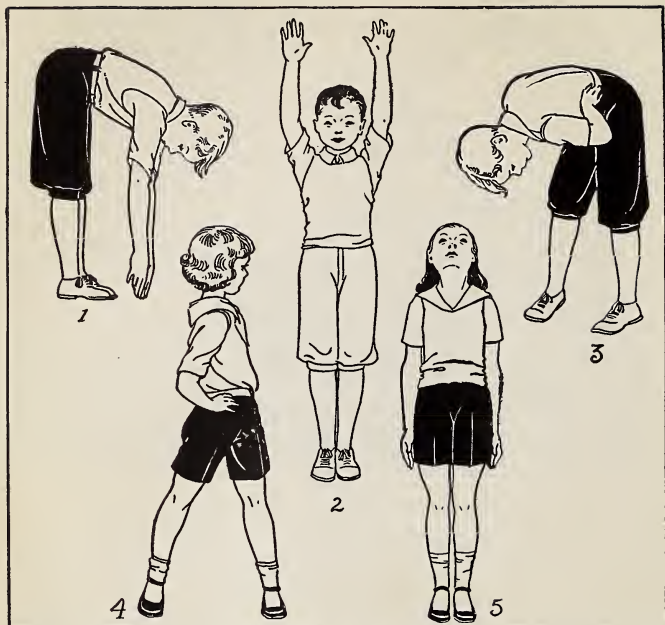
Keep the trunk straight, but not stiff.

Rest the feet flat upon the floor, with the toes pointed forward.

Muscles will become tired when you sit too long in one position. It will give them some relief to twist the body to one side or the other or move the position of the arms and legs from time to time. It is important to return to the proper sitting position after the muscles are rested. When you find yourself sliding too far down into the seat or bending too far forward, straighten up before the body is harmed by these incorrect positions.

The best relief from sitting too long is a lively game played out of doors or in a gymnasium. When this is not possible, the following relief exercises may be done in the classroom from a standing position in the aisles. Be sure to open the windows, and then:

1. Bend the knees and place the hands on the



*Some relief exercises that can be used in the classroom to rest tired muscles.*

floor in front of the feet. Do this four or five times. (Illustration Number 1, above.)

2. Rise on your toes and swing your arms upward as high as you can. Stretch! Return slowly. Do this four to eight times. (Illustration Number 2.)

3. With your feet well apart and your hands on

your hips, make a big bend forward—away down. Return slowly. Do this four to eight times. (Illustration Number 3.)

4. With your feet well apart and your hands on your hips, as in exercise number three, turn your trunk as far as you can to the left. Then turn it as far as you can to the right. Keep your head high. Do this four to eight times. If you wish, you may bend the trunk left and right, instead of turning it. (Illustration Number 4.)
5. Stand erect. Follow an imaginary airplane around in a big circle through the air by turning your head left and right, and lowering it backwards in order to see the plane when it is overhead. Do this slowly. (Illustration Number 5.)

### **Proper Walking Positions:**

Learn to walk with the upper part of the body in the same position that is proper for standing erect.

When you walk:

Hold the chest up and the shoulders back.

Strike the ground lightly with the heels.

Point the toes forward so that the weight of the body will be evenly distributed over the ball (arch) of the foot and all of the toes. It is better to point the toes slightly inwards, Indian fashion, than point them too far outwards.

If you carry heavy loads of books, change them once in a while from side to side. This will prevent the body from being pulled down on one side more than the other or prevent one shoulder from being raised too high.

### **Proper Running Positions:**

When running slowly, run on the toes and soles of the feet. Swing the arms loosely at the sides.

When running fast, as in a sprint, you will go faster if you run on the toes, with the fists clenched.

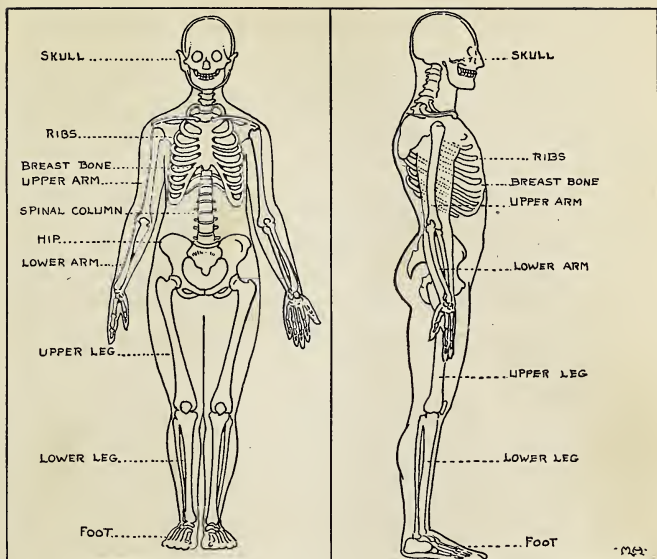
### **Proper Sleeping Position:**

A good sleeping position is one in which you lie on the right side, with the back straight, or slightly curved. Relax, or loosen up your muscles. If you must have a pillow, use a small one. It seems natural to move about somewhat while you are asleep. The muscles get relief in this way.

## **FIRM FOUNDATIONS FOR GOOD POSTURE**

### **The Bones and Muscles**

The bones and muscles share in the work of holding the body up. You can imagine what our posture would be like if we did not have a strong bony framework to help give form and shape to the body. In order to make good posture possible, the bones must grow correctly. Our muscles also need to be strong and well developed. Persons who are weak



### ***THE SKELETON, OR BONY FRAMEWORK, OF THE BODY***

may want to sit and stand correctly, but their muscles are not strong enough to hold them up for very long at a time. These persons need to strengthen their muscles and build up the general health of the body.

Good posture habits are formed by practice. Know what to do and then do it. Habits of good posture, like all habits, are easiest to form when you want to do them, or desire them.

## **The Body Framework and Good Posture**

The bones form a strong framework for the body. In the drawing on page 111, you will see that the skeleton, or bony framework, consists of these three general parts:

1. The bones of the head, including the skull, jawbones, and the bones of the face.
2. The bones of the trunk, including the backbone, or spinal column, the ribs, and breastbone.
3. The bones of the upper and lower limbs.

### **The Joints:**

Our bones are fastened together at the joints in ways that allow them to move in certain directions. The elbow and knee are called hinge joints, because the motion at these places is like that of a hinge. At the shoulder and hip, a rotary, or circular, motion is possible. Because of the construction of these rotary joints, where the rounded end of one bone fits snugly into a hollow socket in the other, these are sometimes called the ball and socket joints.

The ends of the bones at the joints are covered with a soft, smooth substance called cartilage. An oily liquid is secreted at the joints to help the ends of the bones to move smoothly and easily over each other.

The bones are held together at the joints by tough cords called ligaments.



### **Good Building-Materials for the Bones:**

Bones increase in size and strength as the body grows. The bones are composed of mineral and animal matter. The mineral matter gives strength and hardness to the bones. This mineral matter consists principally of calcium, or lime, and is obtained from the foods we eat. The most important foods to supply this calcium are milk, cheese, and leafy vegetables, such as spinach, cauliflower, celery, and cabbage.

Bones also need a mineral called phosphorus. Meats, fish, milk, cheese, eggs, dried peas and beans, whole-grain cereals, spinach, and other leafy vegetables are valuable foods for supplying the body with phosphorus. Be sure to supply the body with plenty of calcium and phosphorus for building good bones and also good teeth.

The body needs plenty of vitamin D in order to build strong, hard bones out of calcium and phosphorus. Vitamin D can be produced in the body by the action of sunshine upon the skin. This makes sun baths especially valuable. Vitamin D is not very widely distributed in foods. Cod-liver oil and other fish-liver oils are excellent sources. There is also some vitamin D in the yolk of eggs and in whole milk. When it is not possible to get plenty of sunshine directly upon the skin, it is important to obtain vitamin D in other ways. A physician will advise you how you can get plenty of this valuable pro-

protective substance, from cod-liver oil or other preparations that contain it.

Bones also contain some animal matter. It is this animal matter which helps to make bones tough and permits them to bend a little without breaking. The bones of young people contain more animal matter than those of older persons. This helps to prevent the bones of young persons from breaking too easily.

### **Posture Affects the Growth of Bones:**

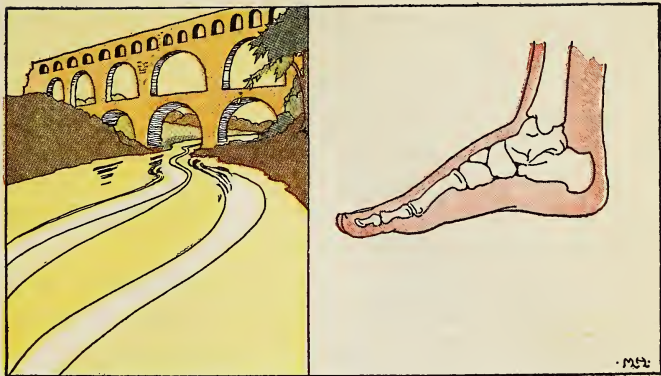
Our bony framework makes it possible for us to hold the body in an upright, or erect, posture. On the other hand, good posture is needed for the proper growth and development of bones. The fact that bones bend more easily when you are young makes it especially important to form correct habits of posture early in life.

### **Clothing May Affect the Growth of Bones:**

The pressure of tight clothing upon the chest or other parts of the body may cause the bones to be forced into incorrect shapes. Wear clothing that is loose enough to allow the bones to grow properly. Also wear shoes that will allow the bones of the feet to grow correctly.

### **The Feet and Their Care**

The feet provide a firm foundation for the body and help to support its weight. The feet raise the



### *AN ARCH CAN SUPPORT GREAT WEIGHT*

body and push it forward when we walk, so that we can move from place to place. The feet also help to absorb some of the shocks or jars that occur when the feet strike the ground in walking, running, and jumping. With all these different uses, you can see that the feet are very hard-working parts of the body. They deserve good care at all times.

### **The Feet Are Built to Support Weight:**

You may wonder what makes it possible for the feet to support the weight of a heavy body for hours at a time. Notice in the drawing above that the little bones which make up the foot are arranged and fastened together in the form of arches. The value of an arch for supporting weight has been known for a long time. The old Roman aqueducts,

as illustrated on page 115, were supported by great arches of stone. The arch is often used today in buildings and bridges to support great weights.

The largest and principal arch of the foot extends from the heel to the toes. Another shorter arch extends across the forward part of the foot. In this way, great strength is obtained from small and light-weight materials.

The bones of the feet are bound together with tough ligaments. They are also attached, by means of tendons, to muscles in the lower leg.

Soft spongy pads of cartilage are placed between the bones of the feet. These act as cushions to absorb some of the shocks and jars which result when the foot strikes the ground.

### **Our Shoes Affect the Feet:**

The kind of shoes you wear will affect the service you get from your feet. Properly fitted shoes will give support to the arches just where it will do the most good. Such shoes help to preserve the shape of the foot.

Improperly fitted shoes harm the feet. They change the shape of the feet and interfere with their work in supporting the weight of the body. Painful foot troubles often result.

### **Requirements of a Properly Fitted Shoe:**

Shoes can be bought in different styles. In order to prevent injury to our feet, we should select shoes



*The bones of the feet are affected by the shape of the shoe.*

that help to strengthen our feet and aid in their work. When you select shoes, see that they will meet the following requirements for a properly fitted shoe:

1. The shoe should not be too large or too small. Test the size of the shoe by standing on one foot. If the foot can be moved about in it freely, the shoe is too large for you. If the leather is tightly stretched across the top of your foot, the shoe is too small for you. Do not attempt to stretch it by wearing it until it feels comfortable. The foot may be injured by that time.

2. The shoe should be long enough so that the toes do not press against the front. Test this with all the weight upon one foot. Test each shoe separately. There are sometimes small differences in the size of the feet or in the shoes.

3. The shoe should be broad enough so that the foot rests flat upon the sole when all the weight is on one foot.

4. The front of the shoes should be rounded to allow plenty of room for the toes without squeezing them. Pointed shoes should be a little longer than shoes with rounded toes. This is necessary to allow plenty of room for the toes back of the narrowed portion of the shoe. It is harmful to force the toes into narrow points of shoes.

5. The heels should be broad in order to give a firm support to the heel. Low or medium-height heels help to preserve the natural shape of the foot. High heels push the foot into the toe of the shoe, and throw the body weight too far forward. High heels cause changes in the shape of the feet. They are a common cause of pains and aches in the feet. The heels should fit snugly so that they will not rub and cause painful blisters.

6. The inner line of the shoe should be straight. If a ruler is placed along the inner side of a normal foot, the ruler will touch the heel, the joint of the big toe, and the end of the big toe. This straight inner line should also be found in the shoes you wear.

No one style or type of shoe will fit all feet. The important thing is to find the type that best fits your feet. When you do this, you will get big returns in comfort and service.



## **Posture Is Important:**

Good posture helps to keep the feet in good condition. It is easier to have good posture when the feet are kept in good condition.

When standing erect, keep the heels close together with the toes pointing straight forward. Support your weight upon the balls of the feet, rather than putting too much weight on the heels. Stand as tall as you can without strain.

When walking, point the toes forward so that the weight of the body will be equally divided over the ball of the foot and all the toes. It is better to point the toes slightly inward than to point them very far outward. As the toes leave the ground for the next step, they push the body slightly forward.

When running, the toes, or the sole of the foot, should strike the ground first. For slow running it is recommended that you run on the toes and the sole of the foot, with the arms swinging loosely at the sides. For short, quick runs, or sprints, you go faster if you run on the toes, with the fists clenched.

## **Weak or Flat Feet:**

A common injury to the feet is the weakening of the muscles that support the arches. This allows the arches to fall so much that the entire sole of the foot may rest flat upon the ground. When this occurs, the center of a flat foot becomes its widest part, rather than its narrowest.

The bones forming the arches of the feet are attached to large muscles in the back part, or calf, of the lower leg. Pain in these muscles or in the inner sides of the ankles is often the first sign of weak feet. Later the pain seems to be felt in the bones of the feet. Other signs of flat feet are a turning outward of the toes, and a turning or bending inward of the ankles. Standing and walking become very painful because of the constant strain on the muscles, tendons, and ligaments. Instead of walking with a firm, springy step, such persons usually have a heavy, flat footed, shuffling manner of walking.

### **How to Prevent Flat Feet:**

Wear properly fitted shoes. They help to support, rather than weaken, the arches of the feet. Improperly fitted shoes often cause this foot disorder.

Avoid overstrain of the muscles which help the foot to support the weight of the body. Overstrain, due to occupations which require a person to stand on the feet for long periods at a time, sometimes results in fallen arches.

Walk properly. Point the toes forward or even slightly inward. Walking with the toes turned too far outwards will weaken the arches of the feet.

Keep the body in good health. Build up strong, firm muscles with the aid of proper foods and plenty of exercise, rest, and sleep. Have your physi-

cal education teacher show you some foot exercises that will help to strengthen the muscles of the feet. Overstrain of muscles when they are weakened by poor nutrition is very likely to weaken the arches and cause them to flatten, or fall.

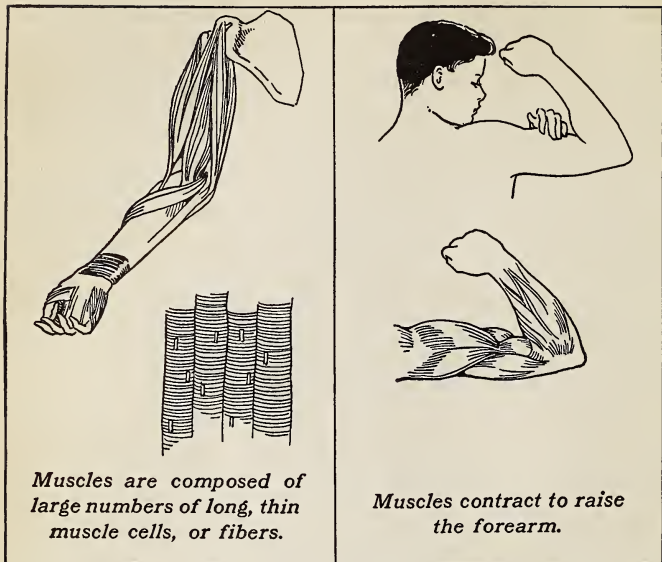
For the relief and cure of flat feet, consult a physician. Arch supports should be worn only when prescribed, or recommended, by an expert. Arch supports do the work that the muscles should do in order to strengthen themselves. They may hinder the muscles from getting back their strength.

### **Prevention and Care of Blisters:**

Blisters form when the skin is rubbed too much by a shoe or a stocking that does not fit properly. Blisters are painful because the outer layer of the skin has become loosened. This leaves the sensitive inner layer without proper protection. Change at once to a more comfortable shoe. Protect the blister from becoming infected. As a new layer of outer skin is formed, the pain disappears. If the blister does not quickly get well with ordinary first-aid treatment, go to a physician to prevent more serious trouble.

### **The Muscles and Proper Posture**

Muscles are useful to the body in many ways. All movements of the body are produced by the work of the muscles. Muscles help to protect blood vessels and other parts of the body from injury. The



### **MOVEMENTS ARE THE WORK OF MUSCLES**

muscles in the walls of the abdomen, for example, help to protect the stomach and other organs located in this part of the body. Muscles share with the bones the work of supporting the weight of the body and holding it up. Proper posture depends greatly upon the condition of the muscles.

#### **Muscles and Muscle Groups:**

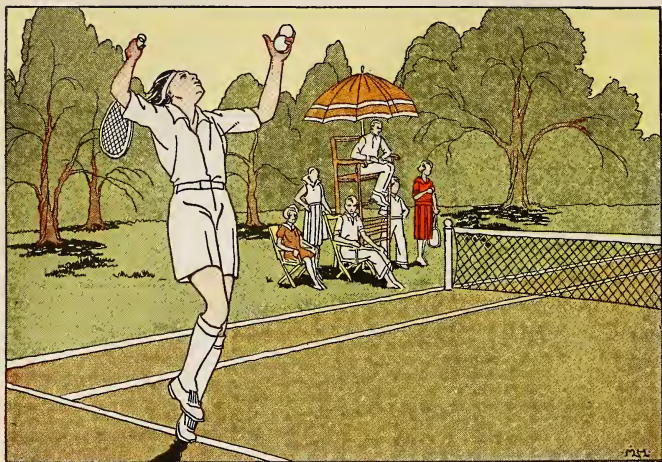
Muscles are composed of large numbers of thread-like fibers, or muscle cells. A single fiber would not

have much strength, so a large number of fibers are grouped together into bundles, and many bundles are bound together with connective tissue to form a muscle, as illustrated on page 122. In order to get still more strength, a number of muscles are arranged into groups so that they will act together.

### **How Muscles Work:**

Muscles move a part of the body by pulling upon it. Most muscles are attached to bones by means of strong cords, called tendons. When a muscle receives a command from the brain, it contracts and pulls upon the part to which it is attached. This action of muscles can be illustrated by the work of the biceps muscle in the upper arm. Place your hand upon the upper arm, as shown on page 122. Raise your forearm and, as you do so, you feel this large muscle contract. As it becomes shorter and thicker, it pulls up the forearm. When you straighten out or extend your arm, the forearm is pulled down by the work of the triceps muscle located on the underside of the upper arm. All muscle groups in the body are arranged in pairs. One set of muscles contracts to produce motion in one direction, and an opposing set of muscles contracts to bring the part back to its former position. These movements can also be illustrated by the bending and straightening of the knee and the turning of the head from side to side.





### *PRACTICE MAKES PERFECT*

#### **Practice Makes Perfect:**

Most people like to do things well. Skill, or the ability to do things well, requires the training of the muscles that are used. When a baby first tries to walk, or a person begins to use a typewriter or play a piano, the work seems very hard. Very little progress is made at first.

As practice continues, the muscles become more and more used to their work. Wrong and useless movements disappear. Speed and accuracy increase slowly at first, then faster and faster, until skill is developed. All this takes hard work, perseverance, and practice, but the end is well worth the effort.



The muscles that hold the body in correct positions for standing, sitting, and walking need to be trained to do their work easily and well. Just as in other things where skill is needed, these muscles will be trained by practice. After you *know* how to sit, stand, and walk properly, you must *do* what is required. Do not permit exceptions to weaken the habit.

### Effects of Alcohol Upon Skill:

Alcohol interferes with the use of muscles principally through its effects upon the brain which directs and controls them. As explained more fully in Unit V, alcohol is a narcotic drug. It dulls or deadens the nerve cells in the brain. This interferes seriously with the fine, delicate control of muscles that is needed for acts of skill. Tests in typewriting and shooting at targets have shown that the work was slower and more mistakes were made when alcohol was taken into the body than when no alcohol was used.

Alcohol is often closely connected with accidents around machinery, because it interferes with the quick and accurate use of muscles. A wrong movement may be made or something is not done quickly enough, and an accident results. It takes skill to guide an automobile on busy streets and highways. Alcohol slows up the speed with which persons can put on the brakes, or turn the steering wheel, when

something suddenly appears before the car. This danger is made worse by the fact that alcohol deceives the driver into thinking he can do these skillful things much better than he really can.

### **Good Muscle Tone:**

Muscles that have good tone are firm and elastic, and respond quickly when directed to act. When muscles are soft and flabby they are lacking in good muscle tone. Good muscle tone is necessary to proper posture. It takes work to hold the body up and to keep its parts in the correct standing, sitting, and walking positions. The muscles can do this work better when they are strong and healthy. Firm, elastic muscles are a big help in lively play, games, and athletic sports. They work quickly and easily. They are more easily trained to do skillful things than soft, weak, flabby ones.

In order to become strong and healthy and have good muscle tone, muscles need the proper foods, plenty of exercise, and sufficient rest and sleep.

### **Muscle-Building Foods:**

In order to be used for growth and repair of muscle tissue, foods must contain substances called proteins. The use the body makes of these foods has been discussed more fully in Unit I, pages 9-10. Good muscle-building foods include milk, eggs, lean meat, and fish. It is especially important to provide the body with enough but not too much protein food.

## Good Exercise from Play and Work

Muscles improve with use. When muscles are *exercised*, they become stronger. When muscles are not used very much for some time, such as during an illness, they become much softer and weaker. Exercise helps to bring back strength and firmness when the illness is over.

Exercise benefits the whole body. When muscles are working, they need more fuel and oxygen to supply them with the power, or energy, they need. Breathing becomes more rapid in order to furnish the oxygen that is needed. This benefits the lungs. The heart also beats faster in order to send this extra fuel and oxygen around the body to the different places where they are needed and to carry off the waste materials that are formed. This gives exercise to the muscles of the heart and strengthens them. Exercise also helps in the elimination of waste materials from the large intestine. Thus, exercise sets in motion a circle of helpful things. It creates a need for more fuel and oxygen, and the meeting of these needs benefits the parts of the body which supply them. The whole body can be said to benefit from exercise.

## Play, Games, and Athletic Sports as Exercise:

The play and games of young people are lively and active. They usually call for some form of running, jumping, or throwing. These are especially

good forms of exercise because they bring into use the big muscles of the body in the arms, legs, shoulders, and back. Running and jumping also play a big part in all forms of track and field sports.

Walking is a good form of exercise for the body. Swimming and skating are lively sports which give us very enjoyable forms of exercise at different seasons of the year.

### **Good Exercise Habits:**

Out of doors in the fresh air and sunshine is the best place to exercise. Try to play out of doors at least three hours each day. If you have to play lively games indoors, be sure to open the windows wide to let in plenty of fresh air.

Rest when you begin to feel tired. Being tired is a sign that the muscles are becoming fatigued. When muscles work, fuel and oxygen are used up and waste materials are formed. When these wastes are formed faster than they can be removed by the blood, they accumulate and clog up the muscles and interfere with their work. As the blood circulates around the body, they affect the brain and cause fatigue, or the feeling of being tired. Rest gives the body a chance to remove these waste materials. Rest also gives the muscles a chance to restore some of the energy that is used up in their work. Many games are divided into periods so that the players

may have short rests during the game. Sleep is the best form of rest.

It is also better to rest just before and after eating than to take part in lively games. This allows a full supply of blood to go to the alimentary canal where it is needed to help digest the food.

If you are overheated at the close of a game, put on a sweater or some other kind of wrap while you are resting. This will help to keep the body from cooling off too rapidly and is useful in preventing colds.

### **Work as Exercise:**

There are a number of useful kinds of work which give exercise to the body. These include such things as running errands, cleaning the yard and cellar, and looking after a garden. These also help to keep you out of doors in the fresh air and sunshine.

## **THINGS TO DO AND THINK ABOUT**

### **A. For Answer and Discussion:**

1. What are some of the values of proper posture?
2. Describe a good position for: (a) standing, (b) sitting, (c) walking, (d) running, (e) sleeping.
3. How can you give relief to muscles that become tired from holding the body in a good sitting position?

4. Describe the importance of the bones and muscles to proper posture.

5. What are the principal building-materials of the bones? What are some of the best foods to supply our bodies with these materials?

6. What is the importance of vitamin D to the growth of the bones? Name several ways in which vitamin D can be supplied to the body.

7. Of what value is the mineral matter to the bones? The animal matter?

8. How can posture affect the growth of bones?

9. What is the importance of the arches of the feet?

10. Describe the requirements of a properly fitted shoe, with regard to: (a) size, (b) length, (c) width, (d) shape of toe, (e) heels, (f) inner edge.

11. How can flat feet be prevented?

12. What are three important uses of the muscles?

13. Describe how skill is developed.

14. What are some of the effects of alcohol upon skill?

15. What is meant by good muscle tone? How may it be developed?

16. Describe several forms of good exercise for the body.

## **B. For Demonstration:**

1. Good positions for: (a) standing, (b) sitting, (c) walking.



2. How muscles work in raising and lowering the forearm.

3. Relief exercises that can be used in a classroom.

4. How to test a shoe for the proper fit.

5. Imprint of a normal foot, and how it differs from a flat foot. This can be done by wetting the bottom of a foot and standing upon a piece of paper.

### **C. A Shoe Exhibit:**

1. A Collection of Used Shoes. This will be helpful to see whether any lessons in the care of the feet can be learned from the appearance of shoes that have been worn. One of the important values from this study should be in connection with the needs for keeping the heels and other parts of the shoes in good repair in order to prevent injury to the feet.

2. Shoes and Footwear from Many Lands. Pictures of footwear can sometimes be used where it is impossible to obtain actual samples. This has a close connection with the manners and customs of different peoples that are studied in geography or the social studies.

## UNIT III

### AIR AND SUNSHINE

#### Fresh Air for Health and Comfort

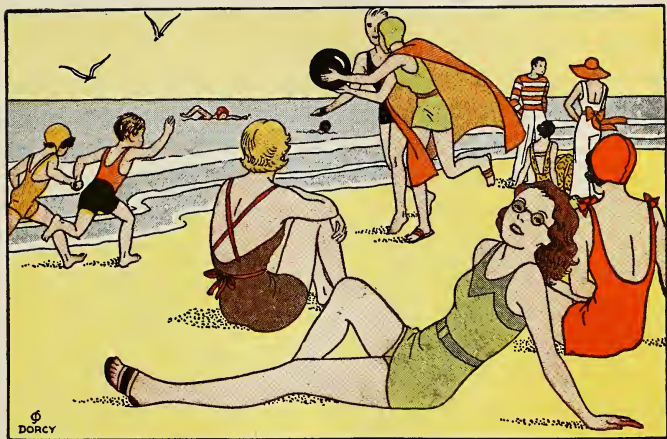
When we go from a warm stuffy room into the cool, fresh outdoor air, we feel refreshed and invigorated. The cool, fresh air acts as a tonic and seems to give us new life.

Air is a colorless gas which surrounds us on all sides. We really live in a sea of air which covers the earth and extends for several miles above it. We must constantly breathe this air in order to live. The condition of the air around us has important effects upon our comfort.

When we speak of fresh air, we mean the air as we find it out of doors. It contains oxygen that the body needs to keep us alive. Fresh, outdoor air is bathed in sunshine. Sunshine kills germs easily and is one of our best disinfectants.

We need fresh air inside our homes to protect us from the discomfort and harm that come from breathing stale, impure air that is not well suited to our bodies.

The air we breathe should not contain harmful dirt and gases. These are injurious to our health. We should make an effort to breathe pure, fresh air at all times.



### NATURE'S TONICS

*Fresh Air—Sunshine—and a Cooling Breeze*

#### The Benefits of Sunshine:

Sunshine is so important to living things that ancient peoples believed the sun to be a god and worshipped it. Temples were built in its honor. People brought gifts to the sun god in order to obtain its help in raising their crops.

The importance of sunshine to the life of plants can easily be shown. Plant some seeds in two different pots. Allow one to sprout and grow in the sunshine and keep the other one in the dark. The one that gets the sunshine will grow and prosper. The other one will be smaller and lack the green color of healthy plants.

Sunshine is especially valuable for producing vitamin D in the body. Vitamin D is beneficial to health and growth, and helps the body to use calcium and phosphorus properly in building good bones and teeth. This makes it especially important for babies and growing children to get plenty of sunshine. In taking sun baths, let the skin become accustomed gradually to the rays of the sun. Do not expose the skin too long and suffer from sunburn. Protect the eyes from the direct rays of the sun by wearing dark glasses.

It is difficult to get enough sunshine during the winter in many parts of our country. At such times, we have to depend more upon other things for our vitamin D. Cod-liver oil and some other fish-liver oils have been found to be such excellent sources of vitamin D that they are sometimes called "bottled sunshine." The yolk of eggs and whole milk also contain some vitamin D. This vitamin can also be obtained from special substances that are prepared for this purpose. It is best to take these substances only upon the advice of a physician who will recommend the proper amounts to use.

The value of sunshine is very helpful to those who are recovering from illness. Sunshine is one of nature's important helpers in bringing back a rosy color to the pale cheeks and strength to the weakened muscles of a person who has been sick.

## **Play Outdoors in the Fresh Air and Sunshine:**

Pupils in the elementary grades should try to play at least three hours a day outdoors in the fresh air and sunshine. There are very few days in the year when it is not possible to play out of doors, provided the clothing is suited to the weather.

## **Health and Comfort Indoors:**

The condition of the air which surrounds us, both indoors and out of doors, makes a difference in our health and comfort. Indoor air becomes changed in certain ways. When people breathe the same air over and over again, it loses some of its oxygen and gets carbon dioxide in place of it. It becomes warmer from contact with our bodies and gets more moisture in it from the air we breathe out.

Persons who breathe the same warm, moist air over and over again in a closed room become restless. It is harder for them to pay attention to things and they feel uncomfortable. If some cool, outside air comes into the room, the persons feel refreshed and seem to have new life and energy.

The temperature of the air around us, the motion of the air, and the amount of moisture in it, all have effects upon our comfort. The heating of our homes is important to health and comfort. It has been found that a temperature of about 70° Fahrenheit is suitable for our homes. In schools,

the temperature is usually kept between 68° and 70° for the most healthful results.

The effects of moving air are very enjoyable when we are hot. We have all enjoyed the refreshing feeling of a cooling breeze upon the body when the weather is hot. When we fan ourselves, the moving air that touches our skin helps to make us cool.

The amount of moisture in the air makes a difference in the way we feel. When there is too little moisture in the air, the skin and the lining of the mouth, nose, and throat become dry. It takes more heat to keep us warm when the air is too dry. When warm air contains too much moisture, it interferes with the regulation of the body heat and makes us feel hot and uncomfortable.

### **Body Heat and Comfort:**

The disturbing effects of warm, moist air upon the regulation of our body heat and the discomfort they cause have been shown by an interesting and unusual experiment. In this experiment a person was placed in a large box that was filled with hot, moist air. He soon felt uncomfortable and sleepy. When he breathed some fresh, outside air through a tube that was passed in to him through an opening in the box, he still felt hot and uncomfortable. The thing that made him feel better was the turning on of an electric fan inside the box. He still breathed



the impure air, but the moving air against his skin cooled him and made him feel much more comfortable. The warm, moist air interfered with the normal regulation of body heat by the skin. The proper regulation of our body heat is very important to our comfort. This regulation is principally done by the work of the skin, together with the clothing we wear and the ventilation we provide for our homes.

### **How the Skin Helps to Regulate Our Body Heat:**

The skin plays an important part in the regulation and control of the heat of the body. It does this chiefly by regulating the amount of blood which flows through the blood vessels in the skin and also by the secretion and the evaporation of the perspiration.

The normal, or usual temperature of the body is about 98.6 degrees Fahrenheit. Heat is constantly being produced in the body when fuel is used up to provide the power or energy that is needed by the body.

The amount of heat produced within the body changes from time to time. There is more produced during exercise than when the body is at rest. Lively games produce more than quiet ones. Some foods produce more than others, the fats and oils having about twice the heat value of the starches and sugars.

When there is too much heat inside the body, the blood vessels in the skin expand, or become larger. This increases the amount of blood in the skin. Some of the extra heat then passes through the skin into the outside air. This resembles the way by which a radiator heats a room. The heat of the water or steam passes through the radiator into the air of the room. As a result of this loss of heat, the water or steam inside the radiator becomes somewhat cooler.

When a loss of heat might be harmful to the body the blood vessels in the skin contract, or become smaller. Less blood flows into the skin, and a smaller amount of heat passes through the skin into the outside air. These changes in the size of the blood vessels take place without any voluntary control or direction from us.

The evaporation, or disappearance, of perspiration into the air uses up body heat. A part of the heat that is needed to make this moisture disappear into the air is taken from the body. This cooling effect can be shown by wetting the skin and blowing upon it. The moisture evaporates rapidly, and a feeling of coolness results from the rapid loss of heat at that place.

Use plenty of warm water and soap to keep the pores of the skin open. Wear the kind of clothing which will assist the skin in its work of regulating the body heat.

## **Proper Clothing Aids in the Regulation of Body Heat:**

Clothing does not produce body heat, but it helps in its regulation and control. Four materials most commonly used for clothing are wool, cotton, linen, and silk. It is important to know which are best suited to cold weather and which should be selected for clothing when the weather is hot.

### **Clothing for Cold Weather:**

Wool is the best material for preventing the loss of body heat in cold weather. It keeps the heat of the body from passing out through it too rapidly. Wool wears well and is used for outer clothing and underclothing. Woolen cloth for outer clothing is woven in a number of different colors, patterns, and styles. Woolen underwear is made in several weights. In modern times, when homes, schools, and offices are warmly heated in cold weather, heavy woolen underwear will cause the body to become overheated when indoors. When you go outdoors in cold weather, put on extra outer clothing rather than wear underclothing which will overheat the body when you are indoors. Heavy woolen underwear is more useful for people who spend a large part of their time out of doors in cold weather. It will be easier for them to keep the body warm and comfortable.

A woolen sweater should be worn under another



### *Suit the Clothing to the Weather*

*In Cold Weather: Help the body to prevent losing too much heat.*

*In Hot Weather: Help the body to get rid of excess heat.*

garment in order to get the most warmth from it. Sweaters should be removed when indoors.

### **Clothing for Hot Weather:**

Clothing for hot weather should allow body heat to pass out through it easily. Cotton, linen, and silk are good materials for summer wear because they are thin, light in weight, and allow heat to pass through them readily. White and other light colors are cooler for summer wear because they reflect some of the heat that falls upon them. Black is a warmer color because it absorbs some of the heat that falls upon it.

### **Amount of Clothing Needed:**

The heating of homes, schools, and offices today is much better than it was years ago. It is now possible to keep rooms at a comfortable temperature in very cold weather. In such cases too much clothing should not be worn indoors. Get the extra protection you need out of doors by putting on an outer garment that you can take off when you go indoors.

Do not bundle up the neck and face in furs or scarf in cold weather. These parts will become used to the cold if they are given a chance. This will help them to withstand rapid changes of temperature between the heated rooms and the cold outdoors. This lessens the chances of taking colds.

### **Wet Clothing:**

Heat passes easily through water. Wet clothes next to the skin permit the body heat to pass out rapidly into the air. Losing heat too quickly weakens the power of the body to resist disease. This is why wet clothing in cold weather may lead to colds or even to pneumonia.

If your clothes or shoes become wet in cold weather, change to dry ones as soon as possible. If dry clothing cannot be obtained immediately, begin at once to produce more heat within the body. Walk rapidly or run; swing the arms vigorously around and around; keep exercising until dry clothing is obtained and the body feels warm again.

Remember that the clothing next to the skin is usually wet from perspiration after a lively game. If you have to sit or stand around quietly in this condition, put on a sweater, or other wrap. This extra covering will keep the body from losing too much heat, and will help to prevent a cold.

Raincoats, overshoes, and rubber boots are specially made for wet weather. The rubber keeps the rain or snow out. It also keeps air from passing through these articles of clothing. This prevents the perspiration from being evaporated into the air and interferes with the proper regulation of the body heat. As a result the body soon becomes damp underneath the rubber clothing. This is not healthful. Raincoats and other articles of clothing made of rubber should always be removed when you are indoors.

### **Proper Care of Clothing:**

Underclothing and night clothing need to be washed frequently to keep them clean. The natural oil secreted by the skin to keep it soft and smooth is absorbed by articles of clothing worn next to the body. They become soiled by solid particles of body wastes that remain when perspiration evaporates. They also contain tiny particles of dead skin that are constantly being rubbed off the outer surface of the body. Be sure to use warm water and soap in washing these clothes. Soap is needed to loosen and



dissolve the oil and grease so that it can be washed away.

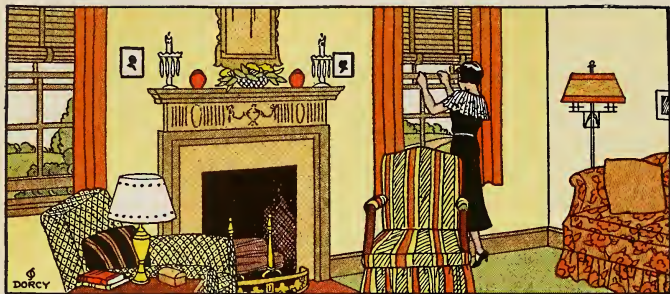
A clean body deserves clean underclothing and clean night clothing. Change these articles of clothing at least twice a week when you wash the whole body with warm water and soap. In hot weather, when the body perspires freely, the clothes should be changed more frequently in order to keep them clean and comfortable.

You do not always have to wear new outer clothing nor the most expensive materials in order to look neat. Clothing lasts longer and looks neater when it is kept clean. Many outer garments can be washed and ironed. Others can have spots removed and be pressed regularly to keep them neat.

Clothing will last longer if it is well cared for when not in use. Hangers are cheap, easy to use, and can even be made at home with very little effort. They well repay for their use in cleaner and neater clothes.

Winter clothing should be cleaned and stored during the summer. The summer clothing should be cleaned and put carefully away during the winter. Take especial care to keep moths out of woolen clothes that are not in use. Damage from moths can be reduced by cleaning clothes carefully before they are put away and by the use of preparations that can be bought for this purpose.

Before going to bed, remove all clothing worn



### LET FRESH OUTSIDE AIR INTO THE HOUSE

during the day and put on suitable night clothing. Hang up day clothing so it can air throughout the night. In the morning hang up the night clothing so it can air throughout the day.

Clothing should fit the wearer and be worn properly. Avoid clothing so tight that harmful pressures are caused. Tight waistbands, belts, and circular garters interfere with the circulation of the blood through the parts upon which they press.

### Proper Ventilation an Aid to Health and Comfort:

We are not able to regulate the condition of the outdoor air. As a result some persons travel to cooler places in the summer and to warmer places in the winter. Inside our homes we can do some things to make the air as comfortable as possible. We do this by means of proper *ventilation*.

Ventilation is the means by which indoor air is

kept fresh and better suited to our health and comfort. The usual way is to bring fresh, outdoor air into our rooms. This can easily be done by opening windows at the top and bottom. The cooler, outside air comes in at the bottom, and the stale, warmer air goes out at the top. By using different windows, it is possible to furnish all parts of a room with a gentle, moving supply of fresh air. Cold air should not come into a room so fast that harmful drafts are produced. A gentle motion of the air is all that is needed. When the air is very cold outside or on windy days, smaller openings will do. When the outside air is nearer the temperature of the room, the openings should be wider in order to make sure that the air is thoroughly changed.

In many schools the windows are used for ventilation with very healthful results. When the weather is cold, the air is passed over heated radiators before it is circulated about the room. In other schools, the fresh air is circulated by large fans, or blowers.

When it is cold outside, the amount of moisture in indoor air is difficult to control. At such times, the indoor air is usually too dry. It dries out the skin and the moist linings of the nose and throat and reduces resistance to colds. This danger can be reduced by letting some outside air into the house from time to time. It can also be helped by evaporating a large amount of water from pans on the furnace and the radiators.

## **Fresh Air at Night:**

The body needs fresh air at night as well as throughout the day. Remember to open the bedroom windows at night. In cold weather, use more bed covers in order to keep warm, rather than have the windows closed. In stormy weather, a window ventilator can be used. A frame covered with a piece of muslin will help to keep out the rain or snow and allow plenty of fresh air to enter the room.

## **The Use the Body Makes of Air**

There is a simple experiment which will help us to understand more about the use that the body makes of air. Place a candle in a jar and light it. Put the lid tightly on the jar and watch the flame soon go out. Light the candle again. Do not cover the jar this time and the candle will continue to burn.

In this experiment we see an illustration of one of the most important things that takes place inside our bodies and also in the world about us. It is that of combustion, or burning, or oxidation—all names for the same thing. Wood, coal, gasoline, and oil will burn only when there is oxygen present. Our bodies must also be supplied with oxygen in order to use food fuels to produce the heat and energy we need. We get this oxygen from the air we breathe. It is carried constantly to all parts of the body by the blood.

## The Air and Breathing:

Oxygen is one of the gases found in the air. In the experiment described above, the candle went out in the closed jar when all the oxygen was used up. In the uncovered jar, the candle continued to burn because it constantly received a fresh supply of the oxygen in the air.

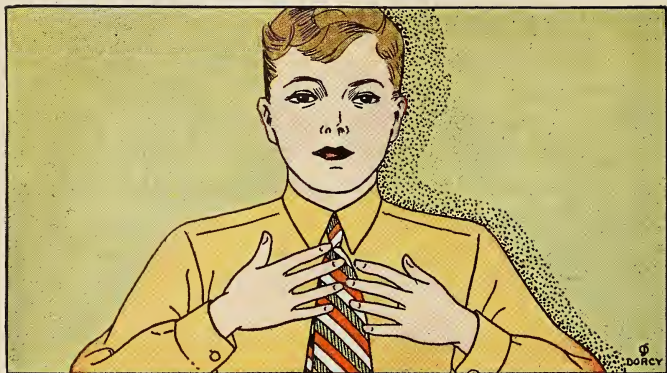
Breathing, or respiration, is the name given to the process by which the body is regularly supplied with air.

Watch a person breathing quietly. Notice the slow, steady rise and fall of the chest and the movements of the abdomen as the air passes in and out of the body. Under ordinary conditions, these movements take place about fourteen to sixteen times a minute. Rest the hands upon the chest and feel them lifted up and lowered again. Place the hands upon the front of the abdomen and feel this part of the body expand slightly as the air is breathed in, returning to its former position as the air is breathed out.

Breathing is a simple, mechanical process produced by the action of muscles. It really consists of two parts, a breathing in and a breathing out of air. The first part, or the breathing in, is called inspiration, or inhaling, while the breathing out is known as expiration, or exhaling.

In order to breathe in, the chest cavity becomes larger. The ribs are lifted up and the chest cavity





### **THE MOVEMENTS OF BREATHING**

*Put your hands upon your chest and breathe in and out.*

enlarges outwards. The chest cavity also enlarges downwards and pushes the abdomen slightly outwards. Air rushes into the lungs to fill this extra space. Each inspiration, or breathing in, of air is followed by an expiration, or breathing out, of air. The chest cavity becomes smaller and forces some of the air out of the lungs.

### **Wear Loose, Comfortable Clothing:**

Loose, comfortable clothing is an aid to correct breathing. It allows the chest cavity to expand naturally. Do not wear articles of clothing, such as belts, waistbands, and corsets so tight that they press too much upon the chest or abdomen. It is better to support the weight of the clothing from



the shoulders so that tight belts or bands will not have to be worn.

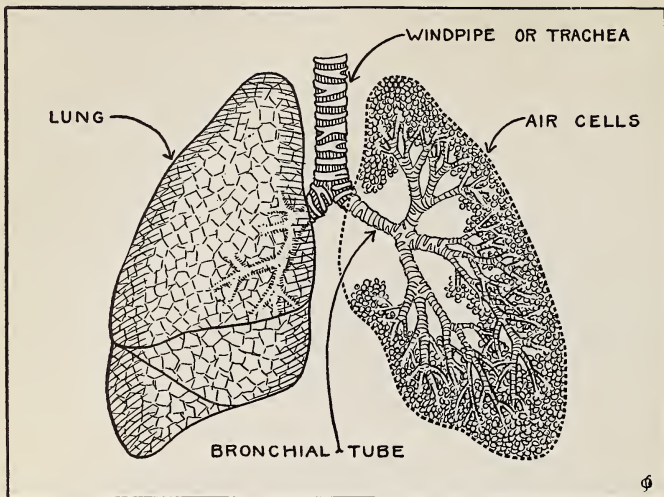
### **Proper Posture Aids Breathing:**

Proper posture is an aid to breathing. It allows the chest cavity to enlarge in a normal way. Incorrect positions of the body which cramp or press upon the chest or abdomen interfere with natural breathing. Stooped shoulders prevent the chest from expanding properly. Sliding down in the seat cramps the chest and abdomen, causes stooped shoulders, and leads to shallow breathing. Compare your sitting, standing, and walking positions with those given on pages 105-110.

### **The Importance of the Lungs:**

The lungs, two in number, take up the largest part of the chest cavity. They are extremely light and elastic and act as storehouses for air.

The air we breathe enters the body through the nose or mouth. It passes on through an opening in the back part of the throat into the windpipe, or trachea. In the drawing on page 150, you see that the windpipe divides into two parts before it reaches the lungs. These branches are called the bronchial tubes. One bronchial tube goes to the right lung and the other one to the left lung. Inside the lungs, each bronchial tube divides again and again, finally ending in clusters of tiny air cells. The whole arrangement resembles a tree that is upside down.



### *THE AIR WE BREATHE ENTERS THE LUNGS*

A network of tiny blood vessels surrounds each air cell. This allows the blood to get very close to the air cells. The millions of air cells in the lungs allow a large amount of blood to be spread out in the lungs at all times. It is in these tiny air cells that the blood takes some of the oxygen from the air. As explained later in this unit, most of this oxygen is taken up by the red corpuscles of the blood, and is carried by them to all parts of the body. It is also in these air cells that a waste product, called carbon dioxide, is removed from the blood and sent out of the body in the expired air.

The blood and the air do not come into actual contact in the air cells. As the blood enters the air cells, it spreads out into the tiny blood vessels which surround them. The walls of the blood vessels and the walls of the air cells are so thin and delicate that oxygen and carbon dioxide easily pass through them.

### **Exercise Is Beneficial:**

The muscles used in breathing can be strengthened by proper use. During lively, active games and athletic sports there is a greater need for oxygen in the body. The breathing becomes deeper and more rapid to supply this extra oxygen and carry off the extra carbon dioxide that is produced at such times. This form of deep breathing is a natural process. It strengthens the muscles which are used in breathing. It aids fresh air to work its way into the deeper air cells of the lungs and helps to keep them active and healthy.

### **Breathe Through the Nose:**

In order to breathe correctly, you should breathe through the nose rather than the mouth. The nose is better equipped than the mouth to prepare the air so that it will not injure the lungs. Tiny hairs in the air passages through the nose help to remove particles of dust and disease germs which might harm the lungs. The air passages in the nose also help to warm the air to the temperature of the body

before it reaches the delicate air cells. This is also a protection to them.

Breathing through the nose is sometimes interfered with by the growth of a soft, spongy mass of tissue called adenoids. The adenoids are located high up in the passage leading from the back of the nose to the mouth. If they are enlarged so much that they interfere with normal breathing through the nose, they should be removed.

### **Keep Air Free from Harmful Dust:**

Hard, sharp particles of dust injure the delicate air cells of the lungs. These injuries weaken the power of the cells to fight off attacks of disease germs and often prepare the way for tuberculosis.

Dust is a carrier of disease germs. Some dust is removed from the air before it reaches the lungs by the tiny hairs in the nose, and by the moist lining of the nose and throat. We should do all we can to lessen the amount of dust in the air.

Sweeping and dusting should be done in ways that prevent the spread of dust. The vacuum cleaner is best for cleaning rugs and carpets. Damp cloths are best for dusting. Dry dusting often spreads the dust and germs over a wider area than before. When a vacuum cleaner is not used, many places can be sprinkled with water or with damp sawdust in order to keep down the dust while they are being swept or dusted.

### **Some Accidents to the Air Supply:**

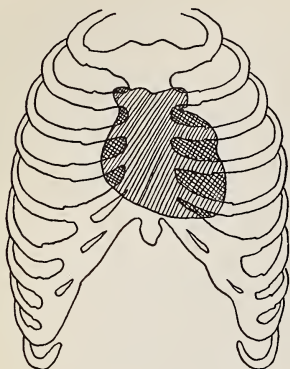
Accidents, such as drowning and gas poisoning, prevent the body from getting the constant supply of oxygen it needs. It is necessary to act quickly at such times if a life is to be saved. The proper things to do when these accidents occur are described on pages 290-292, in the unit on First Aid.

### **Prevent Respiratory Diseases:**

Diseases which affect the air passages and the lungs are called respiratory diseases. The most common ones are colds, bronchitis, and tuberculosis. Colds are so common in many parts of the country and tuberculosis is such a dangerous enemy that special suggestions for their prevention will be found on pages 194-197, in the unit on the Prevention of Disease.

### **The Body's Transportation System**

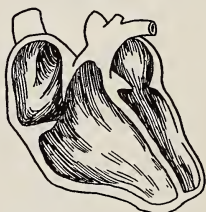
"Come on, let's play ball," some one shouts as school is out. Sides are formed and the game begins. Without our knowledge, extra fuel is supplied to the muscle cells, so that we can have all the energy we need to throw, bat, and run. Our bodies have a wonderful transportation system to carry this fuel and oxygen where it is needed, and to carry off the waste materials that are formed. This work is done by the blood as it travels, or circulates, around the body.



*Position of the  
Heart in the Chest  
Cavity*



*The Heart—  
Outside View*



*The Heart—Inside  
View, showing the  
four Chambers*

## **Around and Around the Body!**

The blood is a thin, watery liquid, with a reddish color. In order to transport, or carry, materials where they are needed, the blood circulates constantly around and around the body in a system of soft, hollow tubes called the blood vessels. The blood is kept in motion around the body by the work of the heart.

The heart is a hollow muscle, about the size of your closed hand, or fist. It is located in the left

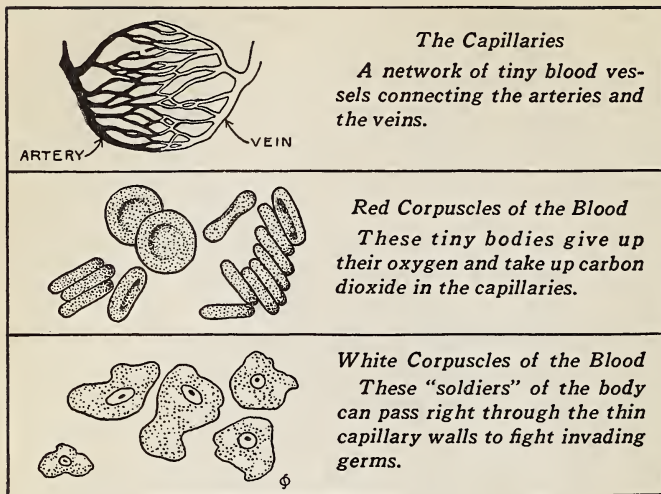


side of the chest and is protected from injury by the ribs and the breast bone. When the heart contracts, it sends blood out into the blood vessels with force enough to carry it on its journey through the body. In the drawing on page 154, you will see the four parts, or chambers, of the heart and the work they do.

The heart and blood vessels remind us in a number of ways of a city water supply system. In a city water system, great pumps force the water out into large pipes or mains. These large pipes soon begin to branch and divide so that the water can be distributed to different parts of the city. Smaller and smaller pipes are used for these branches, until the one that enters our house is many times smaller than the large ones that receive the water from the pumps.

In our bodies we have three kinds of blood vessels, the arteries, veins, and capillaries. The bright red blood that leaves the heart for its journey around the body is all pumped into a big artery, called the aorta. This largest artery in the body soon divides into smaller ones. Each of these branches divides again and again, until there is a network of arteries which carry bright red, fresh blood from the heart to all parts of the body.

The blood returns to the heart in another set of tubes, or vessels, called the veins. Small veins gradually unite with each other on their way to the



heart. In this way we also have a network of veins which carry dark red, impure blood from all parts of the body back to the right side of the heart. This dark red blood then goes to the lungs to be purified by giving up its carbon dioxide and getting oxygen in exchange. The blood, now bright red, goes from the lungs back to the left side of the heart to be pumped out for another journey around the body.

In passing from the arteries to the veins the blood goes through a network of tiny, hair-like tubes called the capillaries. These capillaries are found everywhere in the body. It is about impossible to cut the skin at any place without causing the ap-

pearance of a few drops of blood from these tiny capillaries.

One of the most important things about the capillaries is the thinness of their walls. You will remember that it was stated on page 151 that the walls of the capillaries in the lungs were so thin that the oxygen and carbon dioxide could pass right through them without the blood and air actually coming in direct contact with each other. We learned also, on page 69, that digested food materials pass right through the thin walls of the capillaries in the villi of the small intestines, and get into the blood in this way. These materials then leave the blood by passing through the thin walls of other capillaries into the tissues where they are needed. Waste materials also pass from the tissues through the walls of the capillaries into the blood.

### **The Corpuscles of the Blood:**

The blood may look like thin, red water, but it is really much more than that. Have you ever taken a glass of water from a stream right after a heavy rain, and held it to the light? It is dark and muddy and you cannot see through the glass. After you put the glass down for a while, the solid matter settles to the bottom and leaves the clear, colorless water above it. When some blood is allowed to stand in a dish, something happens very much like that which occurred in the glass of muddy water. After

a time, the more solid parts of the blood settle to the bottom of the dish, leaving a rather thin, colorless liquid part above them. It is this liquid part of the blood which takes up the digested food materials in the small intestine and carries them to the parts of the body that need them. The oxygen and carbon dioxide are carried by other parts of the blood.

The solid parts of the blood consist largely of the very important cell bodies called the corpuscles. They are named according to their color, the red corpuscles and the white corpuscles.

*The Red Corpuscles:* The red corpuscles are so tiny that a single drop of blood contains millions of them. They give the blood its reddish color. Under a microscope, they look like round, flattened discs, piled up on each other like a stack of coins, as shown in the drawing on page 156.

It is the work of the red corpuscles to carry oxygen to all parts of the body. When these corpuscles are carrying oxygen they are bright red in color. After they give up their oxygen to the tissues, they become dark red, or purplish, in color. Thus, the color of the blood really depends upon the color of the red corpuscles in it. Earlier in the book, when we were discussing Foods and Health, it was stated that iron was the mineral substance that was especially needed by the red corpuscles. On page 22, a number of foods were listed as valuable for supplying iron to the body. These included meats (es-

pecially liver and lean beef), the yolk of eggs, dried peas and beans, spinach and other leafy vegetables, molasses, figs, prunes, raisins, potatoes, and whole-grain cereals.

*The White Corpuscles:* The white corpuscles are larger than the red ones, but there are not so many of them. The white corpuscles serve as policemen, or soldiers, for the body. They have the power of changing their shape and passing through the capillary walls into the tissues, and then back again into the blood stream. When enemy germs gain an entrance to the body, white corpuscles go to that place in large numbers and attack the germs. As the battle continues, more white corpuscles are produced in the blood to help the body in its fight against the germs. This work of the white corpuscles is very important to our health.

### **Exercise and Rest Benefit the Heart and Circulation:**

The heart is really a large muscle with four chambers, or compartments. There is also muscle tissue in the walls of the arteries and veins. Moderate exercise will strengthen the muscle tissue of the heart and blood vessels and help to keep them in a healthy condition. Rest is also beneficial to muscles. The heart obtains some rest between each beat.

Overstrain and overwork are injurious to the muscles of the heart. Continued overexercise and overwork do not allow the heart sufficient time for

the rest it needs. As a result, the heart is very likely to increase too much in size and really becomes weaker rather than stronger. Remember that moderate exercise and sufficient rest strengthen the heart and improve the circulation of the blood.

### **Suitable Clothing and Proper Postures Aid Circulation:**

Loose, comfortable clothing will allow a free and easy circulation of the blood through the blood vessels. Belts and other articles of clothing which press tightly upon the body will hinder the proper circulation of the blood through the vessels upon which they press.

Incorrect postures often cause pressure upon the blood vessels and hinder the regular flow of blood through them. Sit up straight in school and avoid slouching down into the seat. Also keep good postures when you study at home.

### **Safeguard the Heart from Disease:**

Cases of heart disease are sometimes due to the effects of other diseases, such as rheumatic fever, chorea (St. Vitus Dance), abscessed teeth, and frequent attacks of tonsillitis. Safeguard the heart by giving it plenty of rest after diseases such as rheumatic fever or chorea, so that it may recover its normal strength. Protect the heart by having diseased tonsils removed and abscessed teeth properly treated or removed.



## **Avoid the Dangers from Alcohol and Tobacco:**

One of the first effects of alcohol upon the circulation of the blood is to cause the blood vessels to expand. This gives the person who has taken alcohol into the body a feeling of greater warmth, because there is more blood in the blood vessels in the skin. In this condition more heat may escape into the surrounding air than the body can afford to lose. In cold climates or in cases of long exposure to cold, this is a very dangerous condition, for the person really thinks he is much warmer than he really is.

Tobacco contains a poison called nicotine. Even in small amounts it interferes with the normal working of the heart. Immoderate use of tobacco, especially in young people, excites the heart, and causes it to beat rapidly. The heart becomes fatigued, or tired. This is a dangerous condition and should be avoided. Young persons should never smoke. It is a harmful and expensive habit.

The fact that older persons seem to be able to smoke without damaging the heart is because they have reached full growth and their nervous system is better able to resist the disturbing effects of the tobacco. With some grown-ups, tobacco is a cause of irregular beating and pain in the region of the heart.

## **First Aid for Bleeding:**

The normal clotting of the blood soon checks the

flow of blood in ordinary cuts and wounds. Use iodine or another suitable germ-killing substance to prevent infection of the wound. In cases of severe bleeding, when an artery or vein is cut, send for a physician and apply the first-aid treatment that is described in Unit VI, page 287.

## THINGS TO DO AND THINK ABOUT

### A. For Answer and Discussion:

1. What is meant by fresh air?
2. Tell some of the beneficial effects of sunshine upon our bodies.
3. In what ways are persons in a closed room affected by stale, impure air? How can these conditions be relieved?
4. What three air conditions have been found to have important effects upon our comfort? Describe an experiment that led to the discovery of the ways in which the condition of the air around us affects our comfort.
5. How does clothing aid in the regulation of body heat? Why is it important to select clothing to suit the weather?
6. Why is wet clothing more dangerous than dry clothing in cold weather?
7. What is the purpose of breathing? Describe the movements of breathing, and what they do for us. How can we aid these movements?
8. What important work takes place in the lungs?

9. What are some of the precautions that we can take to protect the delicate lungs from injury?

10. What is some of the important work of the blood?

11. Describe briefly the work of: (a) the heart, (b) the arteries, (c) the veins, (d) the capillaries, (e) the red corpuscles, (f) the white corpuscles.

12. In what ways can we aid the work of the heart and the circulation of the blood?

### **B. Statements to Complete:**

Write on a paper or in your health notebook the word or words which best complete the statements below. Do not write in this book.

1. By fresh air we mean:  
heated air,                      cool air,                      outdoor air,  
moving air.
2. When a room makes you feel sleepy, it needs to be:  
cleaned,                      ventilated,                      heated,  
dusted.
3. The blood gets its supply of oxygen in the:  
arteries,                      stomach,                      small intestine,  
lungs.
4. Breathing and the circulation of the blood are aided by:  
going to bed early,                      reading good books,  
exercise,                      alcohol.

### **C. Easy Experiments:**

1. Burn a candle in a closed jar and then in an

open jar, as suggested on page 146. What causes the differences that occur?

2. Observe the effects of sunshine and the lack of sunshine upon growing plants, as suggested on page 133.
3. Watch a person breathing quietly. Describe what takes place. If a bellows can be obtained, compare the movements of breathing with those of a bellows.
4. Follow the motion of air in a room where windows are opened by holding a burning candle or burning incense at different places in the room and watching how the smoke moves. Try it with windows open only at the top or the bottom and then open at both top and bottom. The effects of window ventilators can be learned in this way.
5. Keep a temperature record for the classroom and for your living rooms at home. Take the temperatures at about the same times each day. Notice how they compare with the classroom and living room temperatures suggested in the text.

## UNIT IV

### KEEPING WELL

#### **The Prevention of Communicable Diseases and Other Illnesses**

In an old Greek story we are told that a little girl named Pandora once found a very interesting-looking box in her home. She was warned never to open it. She became so curious, however, that she could not resist temptation and lifted the lid. As she did this, out flew all the troubles of the world. In order to help overcome these troubles, we are also told that Hope flew out of Pandora's Box at the same time.

Diseases are the cause of many of our troubles and sorrows. They cause a large amount of absence from school, loss of time and money from work, and often shorten life. Communicable diseases are those which can be passed from one person to another.

#### **Unseen Friends and Enemies**

For thousands of years persons knew very little about the real causes of disease. Many guesses were made, such as that of Pandora's Box and others just as far from the real truth. It remained for the invention of the microscope in the 17th Century to open the way to the first real progress, by showing

that there was a world of tiny animal and plant life all around us. Less than a hundred years ago, in the second half of the 19th Century, the great French chemist, Louis Pasteur, made a wonderful discovery about these tiny forms of life. He found that these tiny microbes, bacteria, or germs, caused fruit juices to ferment, made foods spoil, and were even a cause of disease. With this knowledge, the work of preventing disease has made greater advances in the few years since this discovery than it had during all the thousands of years that had gone before.

Most of these tiny forms of life are harmless to the body and often aid us in many ways. They cause the decay of dead and useless materials, such as leaves, fallen trees, and other vegetable and animal matter. They also cause bread to rise, milk to turn sour, cheese to ripen, cider to turn into vinegar, and fruit juices to ferment. They aid the work of the world in many useful ways.

Disease germs are harmful kinds of life. At times they gain an entrance into our bodies and are the causes of pain, suffering, disease, and even death.

### **How Germs Grow and Cause Disease:**

Germs can grow very rapidly in places where it is warm, moist, and dark. They grow, or multiply, by dividing in half. Inside our bodies germs find conditions of warmth, moisture, and darkness that are very favorable to their growth. Fortunately for us,



the body has some very excellent defenses against them.

Sunlight is unfavorable to the growth of germs and kills them easily. Heat will destroy germs if the temperature is high enough. Cold usually does not kill them, but it will keep them from growing as long as the temperature remains low. When it gets warmer, they become active again. The things which hinder their growth are very useful in showing us methods by which we can control them.

When disease germs grow or multiply inside the body, they form poisonous substances called toxins. These toxins are absorbed by the blood and carried around the body. They poison the cells and may interfere seriously with the work of the heart, brain, and other important parts of the body. They cause weakness, pain, and sometimes result in death.

### **Prevent the Spread of Germs:**

A very important defense against any communicable disease is to prevent the spread of the germs which cause them. This is not an easy thing to do because the germs are so small that we cannot see them and they can be spread in so many different ways. What others do is quite as important as what we do. Everybody must work together in order to prevent the spread of disease.

Disease germs can gain an entrance to the body in different ways. They may enter through the



*The discoveries of Louis Pasteur pointed the way for real advances in the prevention of disease.*

gateways of the nose and mouth, in the air we breathe, in our food and drink, or from the fingers or other things that are put into the mouth. Germs can also get into the body through cuts and wounds in the skin and from the bites of certain insects and animals.

Clean personal habits and the proper care of the

home, school, and neighborhood are useful in preventing the spread of disease. Pure food and water and safe methods of getting rid of garbage and sewage are very important aids in protecting us against disease germs. There is plenty for all of us to do in this important work.

### **Habits of Personal Cleanliness**

Old Egyptian records that date back thousands of years to the time the pyramids were built show that people even in those far-off days washed their bodies in order to be clean and to feel more comfortable.

It has remained for discoveries within the last hundred years to show a close relationship between personal cleanliness and health. Many diseases are caused by germs. These tiny forms of life live and grow well in dirt and unclean places. They are spread from place to place by dust in the air. They cling to all sorts of things that are touched by the hands, clothing, and shoes.

Habits of personal cleanliness are those which help to keep your person clean. By this we mean your hands, face, and other parts of your body, and the clothing which covers the body. Habits of personal cleanliness help to prevent the spread of disease germs. Being clean and neat also has an effect upon the way you feel. It increases self-respect. It aids you to walk, talk, and act without having to

feel ashamed or to make apologies for your appearance. You can get much pleasure from being clean and neat.

After you become used to being clean and neat, you feel uncomfortable when you are dirty. It is impolite and disrespectful to those around you to have dirty hands or face, or unclean clothes. If you want people to think well of you, keep yourself neat and clean.

### **The Skin Covers and Protects the Body:**

The outer layer of the skin, as explained on pages 79-80, is made up of layers of flattened cells. This provides the body with a waterproof covering that keeps out dirt and disease germs so long as it is not broken. When breaks occur in the skin, a clean skin gives better protection from these dangers.

Many habits of personal cleanliness are needed. Some are connected with the washing of the hands, face, neck, and ears. Others refer to baths and bathing and the proper care of the hair and nails.

### **Clean Hands, Face, Neck, and Ears:**

The hands, face, neck, and ears are more exposed to the dust and dirt of the air than the parts of the body that are usually kept covered by our clothes. For this reason they need frequent washing to keep them clean.

The hands touch so many different things that they should be washed many times a day. Be sure

to wash them before meals and after going to the toilet. Wash them before going to school or any other place where you need to present a clean, neat appearance.

Whenever possible, wash the hands with warm, running water. Use plenty of soap to loosen and remove the grease and dirt. Dry the hands thoroughly. This will keep them from becoming chapped in cold weather.

The face, neck, and ears should also be washed several times a day. Wash them when you get up in the morning, before meals, and just before you go to bed at night. When you wash these parts of the body, use warm water, a wash cloth, and a mild soap that will not harm the skin. Dry the skin thoroughly before going outdoors when the weather is cold. This will help to prevent chapping.

### **Baths and Bathing:**

The whole body needs washing with soap and warm water at least twice a week. In hot weather cleansing baths will be needed oftener to keep the body clean. One of the best times to take a warm bath is just before going to bed, as the action of the warm water upon the body is quieting and an aid to restful sleep.

A clean body deserves clean clothes. Put on clean underclothing after a cleansing bath. Remember to use your own personal towel.

Certain parts of the body, such as the feet and

under the arms, perspire rather freely. Wash these parts daily with warm water and soap to keep them clean. Also include in the daily washing those parts of the body that are connected with the elimination of body wastes.

Cold baths are taken by many persons for the benefits they give the skin rather than for cleanliness. If you do not wish to cover the whole body with cold water, bathe the arms, shoulders, and chest each morning. After a cold bath rub the body vigorously with a coarse or Turkish towel. This brisk rubbing soon brings back warmth and color to the skin. It is an aid to a healthy skin. If this pleasant feeling of warmth and glow does not return in a minute or so, it shows that the person probably cannot stand a cold morning bath and it should be continued only on the advice of a physician.

### **The Hair and Nails:**

The hair and nails are parts of the outer layer of the skin which grow in ways that give special protection to certain parts of the body. The proper care of hair and nails adds to our appearance and helps them to grow properly and keep in a healthy condition.

### **Proper Care of the Hair and Scalp:**

Our hair is useful in protecting the top of the head from blows and sudden changes in temperature. Each hair grows from a root which is en-



closed within a little pocket in the inner layer of the skin, as shown in the drawing on page 79.

The hair should be combed and brushed several times a day to keep it neat and attractive. Tiny oil glands in the inner layer of the skin produce a natural oil which spreads over the hair and helps to keep it smooth and glossy. It also prevents the hair from becoming too dry and breaking too easily. This oil, however, helps to make dust and dirt cling more easily to the hair. Particles of dead skin from the scalp also get caught in the hair. For these reasons the hair needs regular brushing and occasional washing with warm water and a mild soap.

Vigorous brushing benefits the hair. It helps to loosen and remove dust and particles of dead skin. It spreads the natural oil over the hair to make it smooth and glossy, aids the health of the scalp, and promotes the growth of the hair.

The hair and scalp should be washed regularly with warm water and a good toilet soap. About once or twice a week for boys and once a week for girls is a good rule to follow. If the hair becomes too dry from frequent washings, it should be washed less, and a little vaseline or olive oil often should be rubbed thoroughly into the scalp by the fingers. Persons who work or play in dusty or dirty places will need to wash their hair oftener to keep it clean. Short hair is easier to wash and keep clean. Have the hair cut often enough to keep it neat.

It is important to use only your own comb and brush. Do not allow others to use them. This will help to prevent the spread of scalp diseases and vermin (lice). Vermin can be killed by the use of coal oil (kerosene) or tincture of larkspur on the hair. Apply these substances as directed by a physician, nurse, or druggist. Follow this with the treatment they suggest for removing the nits (eggs of the vermin) from the hair.

### **Proper Care of the Nails:**

The finger nails give protection to the ends of the fingers and are useful for picking things up. The toenails protect the toes. The nails are special forms of the outer layer of the skin. They continue to grow as long as the root is not destroyed.

The condition of the finger nails is an important part of our appearance. Keep them clean. It is a good habit to clean the finger nails when the hands are washed. Use a nail brush with warm water and soap, if needed. A wooden orange stick is useful for pushing back the skin around the edge of the nail. Do this gently. If sharp, metal blades of knives or scissors are used for this purpose, they may cut the skin beneath the nail and cause an infection.

Trim the finger nails by cutting them in the same rounded shape as the ends of the fingers. Well-trimmed nails look neater and are easier to keep

clean. Biting the nails is a bad habit. It often causes the flesh to roll back over the nail, causing painful and ugly-looking fingers.

The best time to care for the toenails is right after a warm bath when the nails and tissues around them are soft. Cut the toenails straight across. When toenails are cut too short and the shoes are too tight, the edge of the nail may grow under the skin. This is called an ingrowing toenail, and can be prevented by cutting the nails properly and wearing the right kind of shoes.

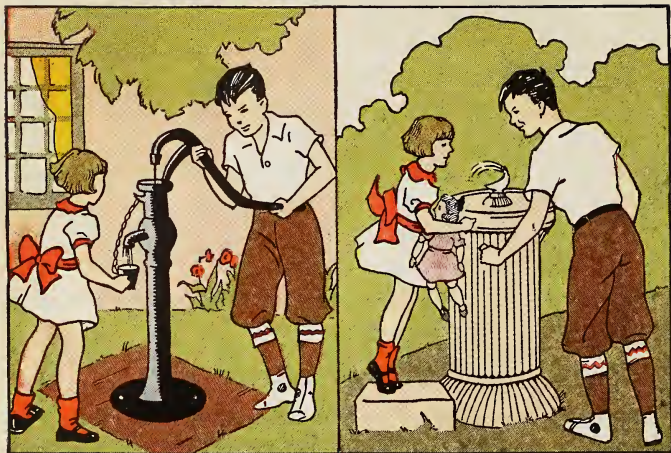
### **Use Individual Drinking Cups:**

Protect yourself from disease by refusing to use drinking cups, towels, or combs that may be found in public places. The use of these things by different people can spread disease. These dangers are being reduced by the use of bubbler fountains, individual drinking cups, and paper towels.

### **Precautions for Coughing, Sneezing, and Spitting:**

The nose and mouth may contain disease germs. When you cough or sneeze, tiny drops of moisture are forced violently from the mouth and nose. These droplets may carry germs with them and scatter them about. Cover the mouth and nose with a handkerchief to prevent this. Always turn your head to one side or away from other people when you cough or sneeze.

Germs also may be spread in the moisture of the



### *The Old Way*

*The common drinking cup  
spreads the germs of disease.*

### *The New Way*

*Individual drinking cups  
and bubblers safeguard  
health.*

sputum, or spit. This moisture may cling to the shoes and be spread in this way. When the moisture evaporates into the air, the germs can be spread by dust. If you are forced to spit, deposit the sputum in something that can be thoroughly cleaned, sterilized, or burned.

Spitting in public places is forbidden by law, and warning notices are posted to remind persons of the dangers of this practice. "Don't Spit—It Spreads Disease," is a health slogan, or command, which should be faithfully followed.

## THINGS TO DO AND THINK ABOUT

### A. For Answer and Discussion:

1. What discovery of Louis Pasteur led to great advances in the prevention of communicable diseases?

2. Describe some of the conditions that favor an increase in the number of germs and some conditions that check their growth or destroy them.

3. In what different ways can disease germs enter our bodies?

4. What is meant by habits of personal cleanliness?

5. Why is personal cleanliness an important link in the chain of disease prevention?

6. What good habits should be formed in connection with:

a. Washing the hands.

b. Washing the face, neck, and ears.

c. Washing the whole body.

d. Care of the hair and nails.

7. What precautions should be taken to prevent the spread of disease germs by means of:

a. Drinking cups and towels.

b. Coughing, sneezing, and spitting.

### B. An Exhibit and Demonstration:

An exhibit of the tools and articles that aid in personal cleanliness would be helpful in checking upon the practice of the habits and the best ways of using the necessary tools. The exhibit would



include different types of toilet soaps, towels, wash cloths, combs, brushes, nail files, orange sticks, toothbrushes, tooth paste and powder, dental floss, and handkerchiefs. Demonstrations of the proper use of these articles and reports from committee members on how different animals keep themselves clean could be made. Some very interesting booklets and posters can be obtained free from the "Cleanliness Institute," New York City.

### **C. For the Library Reference Table:**

1. "Louis Pasteur," a booklet in the Health Heroes Series, distributed free by the Metropolitan Life Insurance Company, New York City.

2. "After the Rain," and other booklets on personal cleanliness distributed by the "Cleanliness Institute," New York City.

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## **WORKING TOGETHER FOR HEALTH IN HOME, SCHOOL, AND COMMUNITY**

Our health depends upon what others do as well as upon our own personal habits. It depends upon the care that is taken to protect our food and water supply and the way we get rid of sewage and other wastes. Wherever people live in groups, it is necessary for each to act in ways that protect the health of the others. All should work together for health—in the home, the school, and the community.



## Health in the Home:

A clean home helps to protect our health. The growth of disease germs is favored by dirt. Sunlight is a good disinfectant and kills germs easily. Keep the kitchen, bath, and all the other rooms clean, and let as much sunlight into the house as possible.

Get rid of rubbish, garbage, and other wastes in ways that prevent the breeding of flies, mosquitoes, and rats.

Care properly for foods in the home. Keep them clean and protected from insects and animals. Take care to keep foods from spoiling. Milk, meats, and other foods that spoil easily should be kept cool in order to prevent the growth of bacteria and molds which spoil them for our use.

## Healthy Schools:

Schools should be built in a way that gives plenty of light, heat, and fresh air for our health and comfort. The building and grounds should be kept clean, and safe to use.

The school is a small community in which all should work together. Help to keep the classrooms, toilets, hallways, playrooms, and playgrounds clean. It is helpful on wet and snowy days to wipe the feet before entering. Put waste papers, fruit skins, and other forms of rubbish in the cans that are provided for them. All the rules for the proper care of the

building and grounds should be cheerfully and carefully followed.

Use good personal habits to help prevent the spread of disease germs. Cover the mouth and nose with a handkerchief when you cough or sneeze. Don't spit—it spreads disease. Use drinking fountains correctly. Consider the health of others when you have a communicable disease. Keep away from classes until all danger of spreading the disease to others has passed.

### **Community Health and Sanitation:**

It is one of the important duties of a community to protect the health of its people. Some things, such as the water supply and the collection of rubbish and garbage, are cared for principally by the local community (the town, township, or city). Other things, such as the inspection of milk and meats and the sale of narcotic drugs, are usually cared for by the state or the national governments.

Town, city, state, and nation work together in safeguarding health. This public health work is usually carried on by means of boards of health, dairy and food inspectors, and public health doctors and nurses. Public health officials, together with other officers of the community, set up and enforce rules and regulations which deal with a number of different things that can affect our health. These include (1) the protection of our food and water



*A quarantine safeguards health. Follow its rules faithfully and cheerfully.*

supply; (2) disposal of rubbish, garbage, sewage and other wastes; (3) control of communicable diseases; (4) regulation of lighting, heating, and ventilating of buildings where large numbers of people may gather; (5) regulation of working hours and conditions of labor; (6) regulation of the sale of alcohol, tobacco, and other drugs; and (7) provision of hospitals and clinics.

### **Obey the Rules of Quarantine for Communicable Diseases:**

There are some diseases which spread easily from person to person, such as smallpox, measles, chickenpox, diphtheria, mumps, scarlet fever, and whooping cough. In order to help prevent their

spread a quarantine is established and enforced by law. The person who is quarantined is not permitted to leave the house until the danger of spreading the disease has passed. Other members of the family also may be required to remain within the house or directed to take other precautions to keep from spreading the disease. When a quarantine is set up, a notice is posted on the house, stating the name of the disease and directing others to keep away until the danger has passed.

Obeys strictly the rules of quarantine. Do all you can to prevent others from catching the disease.

### **Safeguarding Our Food Supply**

Foods can spread the germs of disease. The importance of cleanliness in connection with foods has already been discussed in Unit I, pages 56-63. You will remember that there are many links in the safety chain of caring properly for foods from the farm to our table.

Public health officers inspect markets, dairies, bakeries, ice-cream plants, canning-factories, slaughter houses, and cold-storage warehouses in order to make sure that pure and wholesome foods are supplied to the people. By requiring people who handle food to obtain a license, or permit, the community health officers can compel obedience to their rules and regulations, or refuse to issue the permit. Each member of the community can help in this work

by buying things in places where proper precautions are taken to keep foods free from dirt and germs.

### **Protecting the Water Supply**

Water is one of the great necessities of life. Care should be taken to supply the body with pure water. This is important because digestive troubles and a disease called typhoid fever sometimes result from the use of water which contains disease germs that get into it from sewage and other impurities.

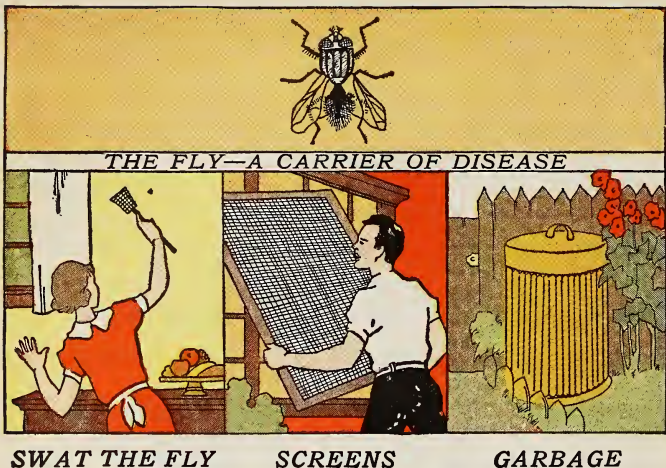
### **Safe Water from Wells and Cisterns:**

The rain water which sinks into the ground often collects into underground pools and streams. In many places this water can be obtained by means of a well which is dug into the ground until this water is reached.

When the water is near the surface of the ground, only a shallow well and pump will be needed. Be sure to dig the well in a place where the drainage from the house and barn cannot find its way into it. These wells should be lined with brick, stone, or concrete. Extend this lining a little above the ground to keep the surface water from flowing into the well. Also keep the top of the well covered.

When the water is far below the surface of the ground, an artesian well is used. In this case a hole is bored and a pipe driven down, often hundreds of feet, until the water supply is reached. The





water will then force itself up out of the well, or else it can be pumped out.

Public health officials will test the purity of water from wells and springs when samples are sent to them. They often post notices along public highways telling us of the fitness of springs, streams, or wells for drinking purposes.

### Safe Water in Towns and Cities:

Getting safe water for towns and cities is often difficult and expensive. Some cities obtain their water from far away lakes and streams where it is purer than the water nearby. This water is brought to the city through large pipes.



Cities that get their water supply from streams or bodies of water that have other towns or cities along their banks have to take great care to prevent impure, or polluted, water from being supplied to the people.

One of the methods commonly used by towns and cities to make the water supply safe is called filtering. The water is filtered by passing it through thick layers of sand which remove impurities. Small amounts of chloride of lime or other chemicals are often added to the water before it is pumped through the mains, or pipes. This is done to kill any disease germs that may still remain in the water.

### **Disposal of Wastes**

#### **Rubbish and Ashes:**

In many communities, rubbish and ashes are regularly collected and taken to places where they can be used to fill in low places, or where they can be destroyed. Do not let rubbish collect around the house. It favors the growth of germs and often serves as a breeding place for flies and rats. If rubbish is not collected by the community, it should be burned or disposed of in sanitary ways. By this we mean ways that are not dangerous to health.

#### **Garbage:**

It is important to care for garbage in ways that will not annoy the people in the community or serve as a breeding place for flies and rats.

In places where garbage is regularly collected from the homes, it is often burned. When garbage is not collected from the home it can also be burned or it can be buried in the ground.

It is important to keep garbage in a covered can. Keep the cover on the can to prevent flies from breeding in it.

### **Body Wastes:**

The germs of typhoid fever leave the body in the waste material that is eliminated from the large intestine. When these waste materials are not disposed of properly, the germs may be washed through the ground into a well or a stream of water that may be used somewhere for the water supply.

In many towns and cities the body wastes are carried away through sewers. These underground pipes may empty directly into a stream of water or the sewage may be carried to a place where it is made harmless before it is emptied into a stream.

In homes not connected with a town or city sewage system, these waste materials can also be disposed of in safe and sanitary (healthful) ways. "Septic tanks" buried underground are often used for this purpose. In these tanks the sewage becomes harmless before it drains off into the ground.

Where outdoor toilets, or outhouses, are used, care should be taken to place them where their drainage cannot get into the well, or cistern. They

should be screened carefully to keep out flies. Keep them in a sanitary condition. Disinfect them frequently with chloride of lime or other suitable substances.

### **Insect and Animal Carriers of Disease**

A number of insects and animals can spread the germs of disease. These include flies, mosquitoes, and rats.

#### **The House Fly Spreads Disease:**

The common house fly can spread the germs of disease. It is an especially dangerous carrier of the germs of typhoid fever and intestinal disorders. It may also be a means of spreading the germs of tuberculosis.

Flies usually select garbage, manure, or body wastes in which to lay their eggs. A large number of eggs are laid at a time. These eggs can hatch out into maggots, or little white worms, in a few hours after they are laid. Within a week or two they have developed into full grown flies.

In order to prevent flies from breeding, remove or destroy all rubbish, dirt, and filth that might serve as a place for the eggs. Keep a tight cover on the garbage can and tight screens on windows and doors of toilets, or outhouses. Keep the house well screened to keep out flies.

On farms or other places where animals are kept the manure should be regularly removed from the

stables and stored in screened bins or tight vaults. There are substances which can be used to destroy the eggs and maggots in these places. Farmers' Bulletin No. 118 of the United States Department of Agriculture, Washington, D. C., gives some useful suggestions for the safe disposal of manure on a farm.

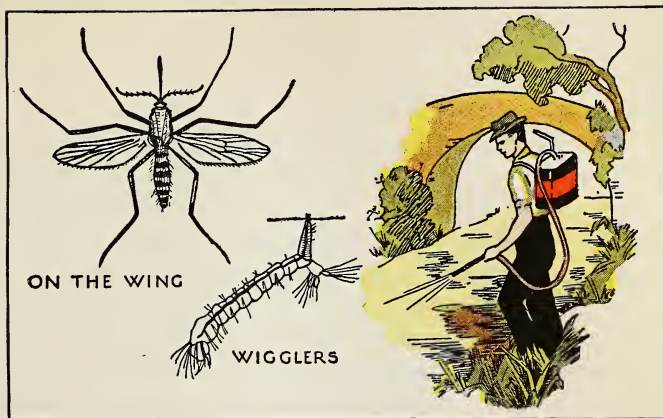
### **Mosquitoes May Spread Disease Germs:**

Mosquitoes are small flying insects which disturb us very much by their bites. Certain kinds have been found to carry the germs of malaria and yellow fever. Yellow fever does not often occur in America, and malaria is much less common than a few years ago.

Although the full-grown mosquito is an insect which flies through the air, it is born and spends part of its life in water. The best time to kill mosquitoes is while they are still living in the water.

The female mosquito lays its eggs in water. It prefers quiet, stagnant pools to flowing streams. In a day or two the eggs hatch into wigglers. These thread-like animals live in the water for a while, and come to the surface from time to time to breathe. In about a week the wigglers enter what is called the pupa stage of their life, and in a few days more the winged mosquito flies into the air to become the pest which bothers us so much.

The best way to kill mosquitoes is to spread a thin film of oil over the pool or stream in which the



*Mosquitoes are nuisances and can spread malaria and yellow fever. Keep them from breeding.*

wigglers are found. This oil prevents them from reaching the air and they soon die.

Around the house mosquitoes often breed in cans, jars, bottles, and other objects which catch and hold rain water. A rain conductor on a house which allows water to stay in it after a storm is over is also a favorite place for mosquitoes to lay their eggs. Rain barrels form other places for mosquitoes to breed. These barrels should be kept covered.

The draining of water from vacant lots and swamps and filling them up with dirt are important in reducing the number of mosquitoes in a neighborhood. When such places cannot be drained success-

fully, they should be treated once in a while with kerosene or crude oil to kill the wigglers.

### **Rats Can Spread Disease:**

Rats are great destroyers of food and property, as well as carriers of disease. In order to obtain their food, rats will destroy corn and wheat both in the fields and after it has been harvested. They spoil and destroy fruits and vegetables in stores and houses. They also feed upon eggs and poultry. Many fires are caused by rats when they gnaw matches or the safety coverings of electric light wires. If there were nothing more to charge against rats than the damage they do, there would be good reason to destroy them.

A dangerous disease called the plague is spread by rats. The germs of this disease live in fleas which are found on rats. In order to prevent the disease, it is necessary to destroy the rats. As the plague is much more common in other parts of the world than in America, ships from many foreign countries are required to put rat guards on the ropes that attach the ship to the dock. A round, tin collar that fits over the rope prevents rats on the ship from getting to the shore.

Rats sometimes injure persons by biting them. The bite of a rat should always be treated promptly to prevent blood poisoning or other disease that might result from it.



In order to get rid of rats keep them from reaching things they might use as food. Keep garbage covered. Destroy old sheds and piles of rubbish in which they can hide and breed. Make places rat-proof by the use of tin, wire, stone, or concrete.

### **How Hookworm Disease Can Be Prevented:**

The hookworm disease is found in the southern part of the United States and in the warmer countries of the world. It is caused by a tiny worm which lives part of its life in the soil and part in our bodies. It gets into the body through the skin and then works its way into the small intestine. The eggs of the hookworm leave the body in the wastes that are eliminated from the large intestine.

Hookworm disease makes persons feel tired and lazy, and severe cases in young people will interfere seriously with growth.

It is a rather easy thing to rid the body of the worms. A simple medical treatment that a physician will prescribe is usually all that is needed. In order to prevent other worms from getting into the body, it is necessary for everyone to dispose of body wastes in properly constructed and sanitary toilets or outhouses. It is also necessary to wear shoes in places where the disease is likely to be found, because a favorite place for the hookworm to enter the body is through the soft, tender skin between the toes.

## THINGS TO DO AND THINK ABOUT

### A. For Answer and Discussion:

1. What are some things that can be done at *home* to prevent the spread of communicable diseases?

2. What are some things that can be done in *school* to prevent the spread of communicable diseases?

3. What is meant by a quarantine? How can we show good citizenship in connection with a quarantine?

4. Describe ways in which safe drinking water can be obtained from wells.

5. Describe ways in which safe drinking water can be obtained in towns and cities.

6. What suggestions are given for disposing of the following waste materials in ways that help to prevent the spread of disease germs:

a. Rubbish and ashes.

b. Garbage.

c. Body wastes.

7. In what ways are each of the following connected with the spread of disease, and what are some of the things that are helpful in preventing these dangers from them:

a. Flies.

b. Mosquitoes.

c. Rats.

### B. A True-False Test:

Read each statement and then decide whether it is true or false in regard to the prevention of dis-

ease. Do not write the answers in this book. Put them on a piece of paper, or in your health notebook.

True False

- |  |       |       |
|--|-------|-------|
| 1. A clean home helps to protect our health.   | ----- | ----- |
| 2. Disease germs can be spread by foods.   | ----- | ----- |
| 3. The location of a well has no effects upon the safety of the water obtained from it.  | ----- | ----- |
| 4. Flies are carriers of disease germs.  | ----- | ----- |
| 5. Screens should be kept in good repair.  | ----- | ----- |
| 6. The best way to rid a community of mosquitoes is to kill all the flying ones you see. | ----- | ----- |
| 7. A rat eats only discarded and useless materials.                                      | ----- | ----- |
| 8. Rats can be kept out of buildings.  | ----- | ----- |

### C. Committee Reports:

1. How the rules and regulations in your community regarding the disposal of rubbish, ashes, and garbage are being kept by the people and enforced by the proper officials.

2. Find out the procedures followed in your state for having samples of drinking water tested for their purity and safety for use.

3. What precautions are taken in your community to make the water supply safe?

4. What diseases are quarantined in your state?

### **D. For the Library Reference Table:**

The following booklets can be purchased at a cost of five cents each from the Superintendent of Public Documents at Washington, D. C.:

1. "The House Rat, the Most Destructive Animal in the World," Bulletin No. 725, United States Department of Agriculture.
2. "The House Fly and How to Suppress It," Farmers' Bulletin No. 1408, United States Department of Agriculture.
3. "Disposal of Manure on the Farm," Farmers' Bulletin No. 118, United States Department of Agriculture.

## **BUILDING A STRONG RESISTANCE**

When colds, influenza, measles, or other communicable diseases are "going through" a school or community, some persons develop the disease and some do not. Those who escape the disease are said to have a strong resistance, or immunity, to it. Those who develop it have a lower resistance, or lack immunity, to it.

### **Natural Resistance, or Immunity, to Disease:**

The body has several means of defending itself against germs. The blood contains several substances that help the body to destroy germs and overcome the effects of their toxins. These include the white corpuscles, antibodies, and antitoxins.

The white corpuscles, as explained in Unit III,

page 159, can pass right through the thin walls of the capillaries into the tissues. Whenever disease germs invade the body, the white corpuscles gather in large numbers at the infected part. They surround the germs and absorb and digest them. A number of white corpuscles may unite and attack a mass of germs in this way. Of course, in a battle of this kind, some white corpuscles are killed by the germs. The pus, or matter, which forms around infected cuts and wounds is partly made up of the dead white corpuscles which have been overcome by germs.

The blood also contains substances called antibodies. These antibodies have been found to kill germs and prevent their growth. Their work is important in providing a strong, natural resistance, or immunity, to disease.

The body also produces antitoxins to help us fight the harmful effects of disease germs. As germs grow, they produce toxins, or poisons, which get into the blood stream. When this occurs, the body manufactures substances called antitoxins. These antitoxins have the power to neutralize, or overcome, the poisoning effects of the toxins.

The digestive juices in the stomach contain an acid that helps to destroy germs that enter the body in our food. The liver acts somewhat as a catch-all and destroyer of germs that escape destruction by other body protectors.

Remember also that breathing through the nose is helpful in keeping germs out of the body. The moist lining of the nose and the tiny hairs in this lining catch dust and disease germs which are breathed into the body. Persons who are not able to breathe easily through the nose should go to a physician to find out what is blocking the easy passage of air through the nose, and to have the defect corrected.

### **Importance of Good Habits of Living:**

Proper habits of living help to strengthen our resistance to disease. When the amount of infection is large or powerful, even a strong body resistance may be overcome by the germs. At such times, however, a strong, healthy body will be a big help in successfully fighting the disease. Good habits of living are especially valuable in protecting against colds, influenza, pneumonia, and tuberculosis.

### **Colds and Their Prevention**

A cold is a disease that begins by affecting the nose and throat. The infection causes the moist delicate lining of the nose and throat to become inflamed and swollen. A large amount of moisture is produced and the nose "runs." Colds are a frequent cause of absence from school and loss of time and money from work.

Colds lower the resistance of the body so that other



diseases may get a start more easily. The infection may spread to other parts of the air passage, and result in bronchitis. The infection may also pass through the tube that leads from the throat to the middle ear or through the openings from the mouth and nose into the sinuses. Dr. Rosenau, of the Harvard Medical School, tells us, "If the sum total of suffering, inconvenience, after effects, and losses in time and money from common colds could be obtained, it would at once promote these infections from the trivial into the rank of serious diseases."

A cold is a communicable disease. It can spread from one person to another. Prevent its spread by practicing the habits of personal cleanliness that were discussed earlier in this unit. These include such things as holding a handkerchief before the nose and mouth when coughing and sneezing. Don't spit. Keep the fingers out of the mouth. Avoid needless contacts with persons with colds, and keep away from overcrowded and poorly ventilated places.

### **Strengthen Resistance by Good Habits of Living:**

Good habits of living, such as those described below, help to strengthen body resistance to colds and many other diseases:

*Eat the proper foods.* Be sure to supply the body with plenty of vitamin A and vitamin D. Some of

the foods which contain vitamin A are listed on pages 17-18. Whole milk and green, leafy vegetables are excellent sources. Vitamin A has been found to be especially useful in keeping the linings of the nose and mouth in a healthy condition. When these moist, delicate linings are healthy, they offer a strong resistance to infections of the nose and mouth. Vitamin D is also helpful. Vitamin D can be produced in our bodies by sunshine which falls directly on the skin. Cod-liver oil and other fish-liver oils are rich sources of it. Milk and eggs also supply us with some of this vitamin.

*Get sufficient rest and sleep.* This helps the body to repair worn-out cells and tissues and to restore strength and vigor to them. Avoid overfatigue. Do not work or play too long without allowing proper time for rest.

*Get plenty of fresh air and sunshine.* Exercise as much as possible out of doors. There are very few days in the year when it is not possible to exercise out of doors if suitable clothing is worn. Do not bundle up the neck in furs or scarfs when you go out of doors in cold weather. The skin should be allowed to become accustomed to changes in temperature between the warm air indoors and the cold air outdoors. Keep the living rooms about 70° Fahrenheit in cold weather. Ventilate rooms so that fresh air can be breathed at all times.

*Get rid of body wastes regularly.* Body wastes

that stay too long inside the body may form poisons that reduce resistance to colds and other diseases. As explained on page 83, proper elimination of body wastes may be aided by eating suitable foods, drinking plenty of water, and getting sufficient exercise.

*Keep the feet and clothing dry.* If the shoes, stockings, and other articles of clothing become wet, change to dry ones as soon as possible. When dry clothing cannot be obtained at once, help the body to produce more heat to make up for that which is rapidly lost through the wet clothes. Do this by swinging the arms rapidly around and around, by running, or by other forms of lively, active exercise.

*Be careful about habits of personal cleanliness.* Wash the hands frequently; always wash them before eating. This will lessen the likelihood of germs being carried into the body with the food.

### **How Body Resistance May Be Weakened:**

Improper habits of living such as those described below help to weaken, or lower, resistance to colds and many other diseases.

A serious lack of sleep and insufficient food will make it easier for the germs to get a start.

Wet clothes and shoes cause a rapid loss of body heat, and colds are more likely to develop.

Overheated rooms in winter dry the moisture from the air passages and reduce the ability of the

moist, delicate linings of the nose and throat to resist infections.

Worry and unhappiness often interfere with digestion, rest, and sleep, and make a person cross and irritable. These conditions are likely to lower resistance to disease.

### **Effects of Alcohol upon Resistance to Disease:**

The regular or immoderate use of alcohol lessens resistance to disease. This appears to be especially true with pneumonia which often proves more serious with users of alcohol than with non-users.

The chronic (steady) use of alcoholic drink weakens the general health and the ability of the white corpuscles and antitoxins in the blood to fight against diseases that may attack the body.

Life insurance companies have found that habitual, or steady, drinkers of alcoholic liquors are not likely to live as long as those who have not developed this dangerous habit.

A study was made by forty-two American and Canadian life insurance companies of records that covered more than twenty-five years. The results of this study showed that the death rates were higher among those who used alcohol when insured than among non-users.

As a part of this study, they examined the records of 42,000 persons who used alcoholic beverages daily, or practically each day. In one group they placed the records of insurance companies that con-

sidered the use of two glasses of beer or one glass of whiskey a day as representing a "steady" drinker. In another group, they placed the records of companies that considered two ounces of alcohol a day as representing a "steady" user. Those in this second group took about twice as much alcohol into their bodies a day as those in the first group.

When the records were studied and compared, they showed that for every 100 deaths which would be "expected" among all the people insured, there were 118 deaths among the first group that had two glasses of beer or one glass of whiskey a day, as their standard of a steady user. In the group that took the larger amount of alcohol each day, the records showed that for every 100 deaths which could be expected among all people insured, there were 186 deaths among the steady drinkers. It is seen from these figures that there were extra deaths in both groups that were listed as steady users, with more occurring as the amount of alcohol was increased.

For a third study they took the record of a group of persons who had formerly been heavy drinkers, and then reformed, or stopped its use. They found that for every 100 deaths which would be "expected" among all the people insured, there were 132 deaths among the people in this group of former drinkers. This shows that the damaging effects of alcohol are liable to be lasting.

## **Prevention of Tuberculosis**

Tuberculosis is a germ disease. It usually attacks the lungs, but may affect the bones, joints, or other parts of the body. It may develop at any age, and is especially dangerous during the years of young manhood and womanhood.

The germs of tuberculosis find their way into the body through the nose and mouth. They may be carried into the body in the air you breathe, in the food you eat, or on the fingers or other things that come in contact with the mouth. For this reason, good habits of personal cleanliness are important in preventing its spread.

The natural defenses of the body are usually able to overcome the germs. When the germs find the body weakened by neglect, overwork, or by other diseases, or when a large number of active germs enter the body at a time (a mass infection), they may prove too strong for the body's defenses, and begin to grow. Good habits of living help us to strengthen our body defenses against this disease.

### **Prevent the Spread of the Germs:**

The ignorance and carelessness of people sick with tuberculosis are often responsible for the spread of the germs which cause it. When persons ill with tuberculosis are forced to spit, this material should be deposited in a paper cup or cloth which can be burned. It should never reach the floor or ground.



Careless spitting often spreads the germs of this disease.

Cover the mouth when coughing and sneezing to prevent the spread of germs through the air by these explosions of air.

Cattle are subject to tuberculosis. Milk and meat from tuberculous cattle are a frequent cause of tuberculosis in the bones and joints of children. In order to reduce the dangers of infection from the milk and meat of tuberculous cattle, many states order the destruction of the diseased animals. They forbid the use of their flesh for foods.

All persons who come in contact with persons ill with tuberculosis or who handle anything used by them should disinfect the hands frequently in order to prevent the spread of germs on them.

### **Importance of Good Habits of Living:**

One of the best safeguards against tuberculosis is body resistance, which may be strengthened by good habits of living. It is much easier to keep well than to get well.

The good habits of living which were described as useful in building up resistance against colds will also help to prevent tuberculosis. Eat the proper foods, and buy only pure, clean foods. Our milk and meat should be from healthy cows. When milk is pasteurized, disease germs in it are killed by the heat.

Exercise in the fresh air and sunshine as much as possible. Get plenty of rest. Sleep in well ventilated rooms. Keep the windows open at night, summer and winter. Air the room during the day.

Keep the body and surroundings clean. Use plenty of soap and water to keep the skin clean. Sunshine is one of the best disinfectants we have for killing germs. Let it into the house as much as possible.

Make proper posture a habit. Avoid stooped shoulders and cramped positions, which press upon the lungs, interfere with their work, and reduce their resistance to disease.

Form the habit of having a medical examination about once a year. This will enable the physician to discover diseases or defects before they become too serious.

### **The Cure of Tuberculosis:**

Many cases of tuberculosis can be cured if they are discovered early enough. As a usual thing, there is no pain or discomfort at the beginning, and the cough does not develop until the disease has gained a start. There are certain signs and symptoms which should cause persons to go to a physician to discover whether or not they are victims of this disease. These include headache; nausea, and loss of appetite; loss of weight; feeling tired more often

and more easily than usual; night sweats; mild fever; and prolonged, chronic (regular) cough.

Tuberculosis cannot be cured by drugs and medicines. The cure consists in doing faithfully all the things which the physician advises, and helping the body in all possible ways. The struggle against the disease is a long one. Too often the treatment is not kept up long enough to prevent the disease from getting a fresh start from time to time.

Rest is one of the first requirements of the cure. Every bit of strength must go toward overcoming the germs. In this disease it is easy to lose all that has been gained by a return to an active life too soon. Be guided by the doctor's orders.

Sunlight and fresh air are essential parts of the cure. Persons ill with tuberculosis or threatened with it should live out of doors as much as possible, day and night. Specially built, open-air porches and sleeping rooms are often used.

Proper foods help to give the body the strength it needs to carry on its fight against the germs. Plenty of good, wholesome, nourishing foods are needed.

Persons who develop tuberculosis greatly increase their chance of getting well if they do not worry too much and fear that their case is hopeless. A strong determination to make a hard fight against it will be a big help to the body in its efforts to check the spread of the disease.

## ACQUIRED IMMUNITY TO DISEASE

Immediately after recovering from a disease, the body is usually immune, or protected, for some time from another attack of the same disease. This is due to the continued effect of the antitoxins and germ-killing substances that are produced during the illness. The length of this immunity varies with different diseases. With some, such as smallpox, measles, diphtheria, typhoid fever, and whooping cough, these substances seem to hold their power for years, and we are likely to have the disease but once. In the case of colds, pneumonia, influenza, and others, the protection does not last so long and persons may have the disease several times, unless it is prevented in some other way.

Among the most wonderful discoveries in recent times is the fact that persons can build up an immunity to certain diseases by the use of specially prepared substances called *vaccines*, *antitoxins*, and *serums*. The number of diseases for which these substances can be obtained is gradually being increased.

### Vaccination Prevents Certain Diseases:

Substances called vaccines are successfully used for preventing smallpox, typhoid fever, and some other diseases.

In past ages *smallpox* was one of the world's most dreaded diseases. It spread rapidly from one person

to another and caused many deaths. Persons who were fortunate enough to recover from it were usually left with deep pits, or scars, in the skin.

Today the disease is almost unknown in places where compulsory vaccination is strictly enforced. Everyone should be vaccinated. The scratch of a needle and the introduction into the body of a few drops of "vaccine" is all that is required. The vaccine is so carefully prepared that if proper care is given to cleanliness at the time of the vaccination and for some little time afterward, the possibility of infection from it is very slight.

The discovery of vaccination, late in the 18th Century, was due to the observation of an English physician, Dr. Edward Jenner. He noticed that dairymaids did not seem to get smallpox as easily as other people. These dairymaids often had a milder, less serious kind of disease called "cow-pox." After recovering from this disease, they were protected from the more dangerous smallpox. It was Louis Pasteur, the great French chemist, who discovered the reason that vaccination protects against smallpox. He found that some kinds of germs could be weakened in certain ways. For this reason, the weakened germs that are taken from a cow are not strong enough to cause smallpox in human beings. They do, however, cause our bodies to produce the substances which successfully protect us against smallpox. One vaccination usually protects from

five to seven years. A second vaccination is said to give lifelong protection. In rare cases, when a vaccinated person develops smallpox, it is usually mild in form. All children should be vaccinated to protect themselves and others from this disease.

*Typhoid fever* is caused by a germ that may get into the body in the water we drink, unless the proper care is taken to prevent it. A vaccine has been prepared which is very successful in preventing typhoid fever. This vaccine causes the body to produce an extra supply of antitoxins and germ-killing substances which give the person an acquired immunity to it. Vaccination against typhoid fever is required in the army and navy. All soldiers and sailors are protected against it in this way, and typhoid fever is almost unknown among them. Whenever there is any doubt about the purity of the water supply, this form of protection should be obtained. Immunity against typhoid fever from vaccination usually lasts only a few years and should be repeated whenever it is felt necessary to renew the protection.

### **Antitoxins Strengthen Resistance to Certain Diseases:**

There are a number of specially prepared substances called antitoxins which help the body to build up a resistance against diphtheria, tetanus or lock-jaw, scarlet fever, and some other diseases.





**THE HEALTH EXAMINATION—**  
*Another Good Habit to Form.*

Diphtheria is a disease which is particularly dangerous during the early years of life. Babies should be protected (immunized) against this disease by the time they are one year old. It is possible, by the use of the Schick Test, to determine whether or not a person has a strong natural immunity. In cases where natural immunity is not strong enough to give the proper protection against it, the use of a specially prepared toxin-antitoxin, or toxoid, will cause the body to produce substances which protect us against it. This immunity is believed to last throughout life.

### **The Health Examination**

One of the important duties of the school physician, nurse, and classroom teacher is to discover pupils with signs or symptoms of communicable diseases. These pupils should not be allowed to attend school until all danger of spreading a disease to others has passed.

Many schools give pupils a health examination at

regular times, usually once a year. The pupils are weighed and measured, and the eyes, ears, mouth, nose, heart, and other parts of the body examined for defects. The results of these examinations are written down and notices of defects sent to the parents.

The human body machine deserves good care. When defects are found, they should be corrected as soon as possible. The school nurse can often help in getting the proper treatment for decayed teeth, poor eyesight or hearing, diseased tonsils, enlarged adenoids, and for underweight, or malnutrition. Remember the school doctor and the school nurse are your good friends. Have your physical defects promptly corrected so that they will not have a chance to become worse and bring harm to other parts of the body. The poisons from abscessed teeth or diseased tonsils, for example, may be closely connected with rheumatism and heart trouble.

After the school years are over it is valuable to keep up this practice of having a health examination at regular times. It is difficult to set any regular time which will suit all persons. In order to care properly for the teeth, it is suggested that you visit a dentist at least twice a year, so that tooth decay does not get too great a start. If you are much underweight or overweight, have defective eyes or hearing, or have other defects that may grow worse as the years go by, you should keep in regular touch

with a physician or other person who is competent to help you. Whether you have such defects or not, it is wise to have a health examination occasionally all through life. When persons reach middle age, it is an excellent thing to have a thorough health examination by a physician at least once a year. This will often prevent serious diseases, such as heart trouble, kidney disease, and cancer from getting too great a start before they are discovered. Persons should take even better care of their own bodies than they do of their automobiles. Persons who have their automobiles regularly inspected each year often fail to get the same service for their own body machine until some actual trouble develops. Prevention is always better than cure.

## THINGS TO DO AND THINK ABOUT

### A. For Answer and Discussion:

1. What is meant by resistance, or immunity, to disease?
2. What is meant by natural resistance, or immunity, to disease?
3. Describe some of the body defenses against disease.
4. What are some precautions which help to prevent the spread of colds?
5. Describe what we can do to help the body build up a strong resistance against colds and other diseases.

6. What are some of the things that lower body resistance to colds and other diseases?

7. What are some of the precautions that should be taken to prevent the spread of tuberculosis?

8. How can body resistance to tuberculosis be strengthened?

9. What are some of the important things in the cure of tuberculosis?

10. What is meant by acquired immunity?

11. How can smallpox be prevented? Name some other diseases which can be prevented by the use of vaccines, antitoxins, and serums.

12. What is meant by the health examination? In what ways is it valuable to us?

### **B. For the Health Bulletin Board:**

1. Make posters with cut-out pictures and original drawings to illustrate the good habits of living that help and strengthen the body resistance to colds and other diseases.

2. Cut newspaper clippings that refer to the prevention of colds, and other diseases.

### **C. Committee Reports:**

1. The results in your state of the work done to prevent diphtheria. This material can usually be obtained from city and state health departments.

2. The regulations in your state regarding vaccination against smallpox. In what ways could they be strengthened?

## UNIT V

### THE PILOT

#### Care and Training of the Nervous System and the Special Senses

When an ocean steamship approaches New York City, Vancouver, or the entrance to other seaports along our coast, a pilot is taken on board. The pilot is a man who has been trained to guide and direct the ship safely to its pier. The pilot is in full charge of the movements of the ship. He steers it in the right direction and also controls its speed by sending messages to the engineer in another part of the vessel.



*TAKING THE PILOT ON BOARD*

In an automobile, the person behind the steering wheel is the pilot who must guide and control the movements of the machine on our streets and highways. On a team the captain is the pilot who directs the players so they will all work together. There are many other examples of direction and control around us—at home, at school, and in business.

In our bodies our thoughts and actions need to be directed and controlled. These very important duties are the work of our nervous system.

### **How Our Pilot Works**

Two everyday things, such as using a telephone or taking a book from a library shelf, will help us to understand more about the ways in which the pilot of our body machine is able to direct and control our thoughts and actions. In using the telephone, you lift the receiver and call or dial your number, and you are soon connected with the person you want. In a library you look over the books on a shelf. After a few moments' thought, you decide the one you want, put out your hand, and take it. Both of these experiences are alike in certain ways. In each case messages go first to a central controlling and directing part. Then, after this central controlling and directing part has acted upon the messages that are received, it sends out the directions, or commands, which make it possible for you to talk to your friend or pick out the book you want.





### THE NERVOUS SYSTEM

*The brain and spinal cord form the central nervous system. The nerves connect the central nervous systems with all parts of the body.*

In a telephone system there is a central exchange which is connected by wires with telephones in the homes and offices of the persons who use them.

In our bodies we have a central nervous system for the work of direction and control. This consists

of the brain and spinal cord. Our brain and spinal cord is connected with all other parts of our body by means of the nerves.

Our brain is really the pilot of the body. It receives messages, acts upon them, and then sends out commands. The brain is located inside the skull which protects it from injury. It is composed of soft spongy material and looks like the drawing on page 215. The brain also directs our thinking as well as our acting.

The spinal cord is a silvery, white cord of nerve tissue about the size of the little finger. It extends downward from the brain through the hollow center of the backbone, or spinal column, which protects it from injury. The spinal cord is made up chiefly of nerves which connect the brain with other parts of the body. The spinal cord can act as a pilot at times and send messages directly to muscles. For example, when we put a finger on a very hot object, the command to the muscles to pull the finger quickly away is sent from the spinal cord instead of the brain. This saves time and lessens the damage to the injured part.

The nerves are thin, white threads of nerve tissue. They form a network within the body so that all parts are connected with the central nervous system, as shown in the drawing on page 215. The nerves which bring messages to the central nervous system are called the sensory nerves. Messages car-

ried by these nerves help us to know when things are hot or cold, rough or smooth. They enable us to see, hear, smell, and taste things.

The nerves which carry messages to the muscles are called the motor nerves. These messages cause muscles to contract and produce the movements of the body.

### **What Pulls the Strings?**

Have you ever seen a puppet show? In a puppet show the actors are dolls and toys, and they are made to move about by pulling on the strings that are fastened to them. Perhaps you have had the fun of making puppets, or marionettes, and learning to work the strings that make them move. When the proper strings are pulled, a puppet dancer bends or turns, or puppet knights in armor battle as they did in King Arthur's Court. After the show is over, the puppets are laid away and have no power to move until the strings are pulled again.

In our bodies muscles move our head, arms, and legs by pulling upon the parts to which they are attached. What makes our muscles contract? Under a microscope, nerve tissue is seen to be composed of nerve cells with thin, thread-like fibers branching out from them. In some unknown way, these nerve cells supply the force, or impulse, which goes out over the motor nerves to the muscles and causes them to contract.

The nerve cells in the brain receive and interpret the happenings in the world about us. Many things, such as the fact that two and two make four, or the appearance of the face of a friend, become so fixed in our minds by the work of these cells that they can be recalled, or remembered, when they are needed.

*Habits*, such as cleaning the teeth at certain times each day, or playing fairly at all times; *acts of skill*, such as walking or throwing a ball; *learning* things, such as dates in history or locations in geography, all result from training nerve cells to act in proper ways.

### **The Importance of Habits**

Habits are ways of doing things that do not require constant thought and attention from us. Habits are formed as nerve cells become accustomed to *doing* the same things over and over again in the same ways. Habits, such as walking, talking, or dressing, begin as slow, painstaking, thoughtful movements. As the actions are continued the nerve cells become accustomed to their work. After the habit is formed, the movements that are needed in order to walk, talk, or dress appear to *do themselves* in the right order whenever they are started.

As habits develop less thought and attention are needed to be given to them. This leaves us free to care for other important matters that do need our careful thought and attention.

## **Bad Habits Are Hard to Break:**

It takes time and effort to break a habit, just as it does to form one. Begin by thinking about the thing that is to be stopped, and keep thinking about it until the habit is broken. In stopping the bad habit of slouching down at the desk at school, for example, you must think about it constantly for a while, for just as soon as the attention is occupied with something else, you are likely to slide down in the seat again. If enough effort is given to it, the bad habit will gradually disappear, and you will no longer need to think about it at all.

Often the easiest way to break a bad habit is to substitute a good one for it. The good habit of sitting erect should take the place of a bad habit of "sitting on the end of the spine." Right methods of cleaning the teeth can be substituted for wrong or careless ones.

## **Train the Nervous System When You Are Young:**

It is easier to learn new things during the years of youth than at any other time. This is an important reason for attending school regularly and making the most of your opportunities to get an education. Remember that the training of the nervous system goes on in school and out. Always think and act in ways which help to form good habits rather than harmful ones.

There are several different kinds of habits which

are very useful to us. *Health habits* make it easier for us to care properly for the body and its parts. *Mental habits* refer to the ways we think and feel. *Social habits* refer to the ways we act in society.

### **Health Habits:**

Habits of taking proper care of the body develop in slow, painstaking ways. They have many uses. Persons who have good habits of personal cleanliness feel uncomfortable when they are dirty. They would not sit down to a meal before washing the hands and face. The habit of exercising in the fresh air and sunshine makes us go out of doors more frequently than if good exercise habits had not been formed. Even the weather is not allowed to interfere, because suitable clothing for all kinds of weather can usually be secured. The habit of cleaning the teeth before going to bed and right after getting up in the morning is a protection against tooth decay. The habit of eating a variety of suitable foods will help to build a strong, healthy body and mind. All good health practices should be developed into habits so that they will be more regularly followed.

### **Good Mental and Social Habits**

#### **Mental Habits:**

The brain is described as the seat of the mind. It is concerned with the way we think, feel, and



act. The condition of the body has an effect upon the mind. For example, it is more difficult to think quickly and properly when the body is undernourished or when you are in pain. On the other hand, the condition of the mind can affect the body. Strong feelings of fear, anger, and worry will disturb the digestion of the food, the beating of the heart, and the circulation of the blood.

Cases of nervous troubles in later years have been traced back to some mental disturbances, or bad mental habits of childhood. Many of these could have been prevented by the early development of proper mental habits. "A sound mind in a sound body" has long been suggested as a goal for all of us. It is well worth working for.

### **Our Thinking Powers Must Be Trained:**

The higher, or thinking, parts of the brain are strengthened and developed by use. We sometimes have to read, write, or study in places where other things are going on at the same time. We can train our *attention* and our *thinking powers* to attend to their work without being disturbed too much by what is going on around us.

There are right ways and wrong ways to study. Proper study habits can be developed by practice. You often have something to memorize, an outline to make, or a problem to solve. In each case work out a *plan* of what you are going to do and the

best ways of doing it. This will save you many mistakes and prevent a waste of valuable time. The final results will be more satisfactory, too.

Take pride in learning to think for yourself. Do not depend too much upon others to do your thinking for you. The world always has need of leaders who can think clearly and act wisely. Practice thinking out small problems for yourself. You will enjoy solving them and at the same time will prepare yourself for harder things.

Be *accurate* in all your work. It will save you much worry and waste of time. Be *thorough*. Enjoy "the satisfaction of work well done." *Persevere* with your work. Do not give up easily because of early failure or because the task is hard. Try out your strength on hard things once in a while.

### **Your Disposition and Your Habits:**

Your friends will name your disposition according to the way you are accustomed to act. Some persons are usually cheerful and friendly, while others are worried or irritable. Some are well controlled, while others are fiery and quick-tempered. Begin early to form good mental habits or traits, which will help to form your disposition.

*Be Cheerful and Happy.* Each of us, no doubt, knows some one who has a sunny and cheerful disposition. There is always a cheery smile and a kindly greeting for everyone. Then we occasionally meet

persons for whom everything seems to go wrong. They appear to be unhappy and are usually cross and irritable.

It should be remembered in both cases that the nerve cells find it easier to act in these ways as time goes on. In the first instance, good nature and cheerfulness become habitual. Friendships are easily made. A cheerful and happy person is welcome everywhere. Cross and irritable persons find it hard to keep from finding fault and acting disagreeable and mean. It is hard for such persons to make friends and still harder to keep them. They usually lead unhappy lives.

Some persons have very few friends, not because they are cross or irritable, but because they are *too shy*. They do not make friends easily. They prefer to be by themselves most of the time. This is not good for their health. They usually do not get enough outdoor exercise. It gives them too much time to think about themselves, and possibly worry about the lack of friends. These people should find some interest that takes them out of doors and among people, and they will gradually overcome their great shyness. On the other hand, it is not well to be *too bold*. Do not always force yourself to the front of everything. Give others a chance to be leaders once in a while.

Try to avoid *worrying* about things. Things usually come out right in the end, and often for the

best. Worrying will not help their solution. Do your best to overcome the trouble or the fear that is causing the worry. Talk things over with some one you can trust and you will usually find a satisfactory way out of your difficulties. Worry has a very harmful effect upon the body. It will interfere with digestion and sleep, reduce resistance to disease, and pave the way to serious ills.

*Practice Self-Control.* It is easy to keep your thoughts and feelings under control when everything goes along as you would like. It is when things go wrong that the habit of self-control should be strong enough to keep you from displays of anger and fits of temper. Anger and temper, like worry, have disturbing effects upon the body. If they are not properly checked and controlled early in life, they are likely to happen more easily and more frequently as time goes on.

A *sense of humor* is a valuable way to relieve one's feelings at times. The time to discover the humorous or funny side of a disturbing thing is at the time it occurs, when the feelings are tense or you are excited.

Practice self-control at home, in the classroom, and on the playground until it has become a well-developed habit of action.

### **Character and Habits:**

Character is built upon a foundation of habits. The habits of *thoughtfulness, fair play, honesty,*

and all the others which go to make it up are developed in the same slow, thoughtful ways that are needed in the formation of all habits. The nerve cells which direct and control these actions grow accustomed to their work by use. The Scout requirement of doing a good turn each day finds its value in the good habits which are formed.

*Serving others* is one of the most enjoyable forms of obtaining happiness. There are many ways of helping others, in the home, at school, and in the community. Running errands and helping with the work about the house gives a chance to do worth while things. They also aid your parents to find more time for pleasure and rest. All of us are helped by a well arranged program of work, play, and rest.

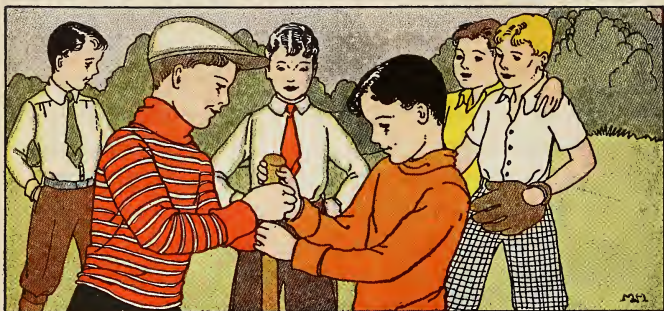
### **Social Habits:**

Social habits are concerned with the ways in which you get along with other people. They include your manners of speaking and acting.

### **Respect the Rights of Others:**

In order for people to get along well together, they should respect each others' rights and privileges. This is true everywhere, in the home and classroom, on the playground, and in a town, city, state, or nation. You have a right or privilege to do many things, but there is usually a limit to just how far you may go in using them. Sometimes the





*PLAY FAIR Be a Good Sport*

limits are set by laws. You are free to walk on the streets of your town or city. If the time should come, however, when you might spread a contagious disease, you must think of the effect of your actions upon others. If you do not do this willingly, the laws of the state can enforce a quarantine and keep you indoors until the danger is over. On the playground the limits are often set by the rules of the game. You should play fairly at all times. Learn to be a good loser when you are defeated. It takes a good sport to lose with a smile and have a word of praise for the victor.

There are many things in which the limits of your actions are set by your own good taste and manners. Persons who are considerate of others will not disturb the rest and sleep of others by playing loud radios, or making other unnecessary noises, late at night.





### **GET PLENTY OF SLEEP**

*Sleep is another of the great necessities of life.*

### **Good Manners:**

Politeness is built upon a foundation of simple habits. Good manners result in self-respect and increase the respect that others have for you. They are especially valuable in obtaining employment and winning advancement in your work.

Simple personal greetings should be developed into habits, such as a cheery "Good morning" or "Good evening." At meals there are many opportunities for showing good manners. Ask to have things passed to you rather than reach across the table, using "Please" and "Thank you" at such times.

In order to be respected, you should act in ways that are suited to the occasion. Some things are always proper, such as politeness, honesty, fair play, respect for the rights of others. On the other hand, some of the noisier and rougher ways of doing things on the playground would be considered as bad manners in the home, school-room, or church. Good manners for all places should be developed into habits. You should not always have to stop and think of the proper things to do. They should *do themselves* at the proper times.

### Importance of Rest and Sleep

The nervous system is aided by good habits of living. Eat nourishing foods and get plenty of exercise in the fresh air and sunshine.

Rest and sleep are especially helpful to the nervous system. During rest and sleep worn out parts of nerve cells are repaired, and their nervous strength or energy is restored. Sleep is the best form of rest; a good night's sleep is refreshing to the body and the mind.

Rest is needed to remove the effects of fatigue. The feeling of being tired is a sign of fatigue. Whenever you move a muscle, some waste materials are being formed. Fatigue is a warning that these waste materials are being formed faster than they are being eliminated from the body. Rest or sleep at such times gives the body an opportunity to get

rid of these waste materials and restore strength and energy to the nerves and muscles. Continued failure to pay attention to these warning signals that the body needs a rest often leads to nervous troubles. After studying hard, it is often restful to take part in some kind of active play or games. On the other hand, after lively muscular work or play, it is restful to read or relax.

Overexcitement and late hours injure the nervous system. They overwork the nerves and interfere with their rest. The habit of attending motion pictures too often or sitting too near the screen is a cause of nervousness and eyestrain.

Children in the elementary grades should go to bed early enough to get from ten to eleven or eleven and one-half hours of sleep each night. Good sleeping habits will help you to obtain restful, healthful sleep. It is important to go to bed at about the same hour each night. When you do this, the body becomes used to expecting sleep at a certain time and you will be more likely to fall asleep without delay. Eat the evening meal early enough to allow an hour or two to pass before it is time to go to bed. Form the habit of going to the toilet just before going to bed.

The conditions under which you sleep will affect your rest. Remove all clothing worn during the day and put on suitable night clothes. Sleep in a dark, quiet place, and sleep alone if possible. Let plenty

of fresh air into the bedroom, summer and winter. Keep the body well covered, but not too warm, as this will disturb your sleep. Learn to breathe through the nose, as the nose is better equipped than the mouth to remove dust from the air and warm it before it reaches the lungs. When you are healthy and get sufficient sleep, you should wake each morning refreshed and ready for the day's duties.

## THINGS TO DO AND THINK ABOUT

### A. For Answer and Discussion:

1. Discuss briefly the comparison of the work of the brain with that of the pilot of a ship.

2. In what ways can the work of the nervous system be compared with a telephone system?

3. How can the performance of puppets, or marionettes, be used to illustrate the work of the nerve cells and muscles in directing and controlling our actions?

4. What are some important values of habits? Select some health habits to illustrate your answers.

5. What are several good mental habits which will aid us in our thinking? Illustrate your discussion from actual examples that have taken place in the classroom work. How might these habits be improved?

6. Name good mental habits or traits upon which your disposition and character should be based. Can you illustrate the meaning of these traits from

among persons you know? What characters have you met in your literature books that illustrate the good or bad development of traits that show a person's disposition and character?

7. What are meant by social habits? Illustrate what is meant by "Respecting the rights of others" and "Good manners" by happenings: (a) in the classroom, (b) on the playground, (c) in the neighborhood, (d) in the home.

## **B. Book Reviews:**

In many classes the pupils prepare short reviews of books they have read in class and at home. Discuss some of these reviews with regard to the mental and social habits that help us to form our ideas of the disposition and character of the persons in the stories.

## **C. Some Topics for Oral or Written English Lessons:**

1. What are some of the things that make a boy or a girl a good sport?
2. How to be a good winner.
3. How to be a good loser.

## **D. A Sleep Chart:**

Keep a sleep chart for a while. You could arrange a page in your health notebook like the chart on page 232.

A check (✓) or a cross (×) placed in the block opposite the number of hours of sleep will show the

## THE BODY AND HEALTH

[illegible]



record for the date at the top of the column in which the  $\times$  is placed.

Draw a heavy line above and below the row that represents the amount of sleep you should have each day. The heavy lines in the sample would be correct for a child between 10 and 11 years of age. The sample record also shows the proper number of hours of sleep until Friday night. A party might have been the cause for the drop in number of hours of sleep on that day. The record also shows that this was made up over the week end, on Saturday and Sunday, either by going to bed earlier or sleeping later in the morning.

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## **HARMFUL EFFECTS OF ALCOHOL, TOBACCO, AND OTHER DRUGS**

### **Alcohol Affects the Body**

Alcohol is one of the products of a process called fermentation. It is produced by the action of yeast plants upon vegetable substances containing starches and sugars. Fruit juices, barley, rye, wheat, and a number of other substances can be used to produce harmful alcoholic drinks.

Alcoholic drinks are those which contain alcohol, such as beer, wine, and whiskey. The amount of alcohol varies among them. Beer usually contains from four to five per cent alcohol, wines from eight to twenty per cent, and whiskey and gin about fifty

per cent alcohol. All produce harmful effects upon the body.

Some of the harmful effects of alcohol upon the stomach and the liver have already been discussed in connection with the digestion of our foods, in Unit I, page 76. In this same unit, on page 76, we also learned that alcohol is not a real food, although it can supply some heat and energy for the body. Some of its effects upon the use and control of muscles were described in Unit II, on pages 125-126. In this unit we shall learn about the disturbing and harmful effects of alcohol upon the nervous system, the pilot of the body. You can easily see that anything which harms the directing and controlling parts of the body is a very dangerous substance to use.

### **Alcohol Especially Affects the Nervous System:**

The brain is the center of the nervous system, directing and controlling our thoughts and actions. It is the pilot of the body. When alcohol is absorbed from the stomach and intestines and enters the blood, it is carried to all parts of the body. So quickly is alcohol absorbed that some of it can be found in the blood stream within three or four minutes after it enters the stomach.

The brain is very sensitive to the effects of alcohol. Small amounts that might not seriously affect some other parts of the body will greatly disturb

the central nervous system. It does this because of its narcotic, or depressing, action.

### **Alcohol Is a Narcotic Drug, not a Stimulant:**

Shortly after alcohol is taken into the body, the heart beats faster and there is a general feeling of warmth. Formerly this caused persons to believe that alcohol was a stimulant. The drinker might become more lively and active, or "stimulated," for a while. You will recall from an earlier grade the action of a stimulant was compared to the use of a whip on a horse.

These effects are really due to a "narcotic," or deadening or depressing, effect that alcohol has upon the brain. The heart beats faster for a short time after alcohol has been taken into the body because the alcohol deadens or dulls the nerves that control the speed of the heart beat. Its action upon these nerve cells in the brain can be compared with that of taking off the brakes of an automobile. The machine goes faster, not because more power or energy is supplied, but because the brakes are removed.

Alcohol is like other dangerous narcotic drugs because it tends to be habit-forming. Occasional drinkers often become habitual, or steady, drinkers. Moderate drinkers may gradually become heavy drinkers. Drunkards do not start out to become drunkards. When they are questioned about the

matter, it is usually found that they began with an occasional drink. The habit grew upon them until it is often very difficult and almost impossible for them to break it. **Safety First! Don't Begin!**

### **Effects of Alcohol upon Judgment and Self-Control:**

After a habit is formed it does itself, without thought from us. This gives us more time for considering matters that need our thought and attention, more time for forming judgments and making decisions. A judgment should be made after thinking things over and considering the effects of our actions upon ourselves and upon others. Good judgment will act as a check upon acting unwisely or harmfully. Alcohol dulls the powers of judgment and self-control and makes persons more likely to do what they would not ordinarily do. Persons whose judgment of right and wrong has been dulled by alcohol often show little regard for the rights and feelings of others.

### **Effects upon the Feelings:**

Alcohol may show its effects upon the brain by a change in the person's mood, or disposition. Alcohol gives the drinker a feeling of well-being, even if there is no good reason for this feeling. This results from the dulling or deadening of nerve centers in the brain which ordinarily would allow a person to consider all sides of the matter. Disagreeable or

disturbing things may be forgotten while the brain is affected by the alcohol. As the amount of alcohol increases, the drinker may become excited or happy, quiet or depressed, may laugh, or cry, showing great lack of control over the feelings.

### **Effects upon Skill:**

The brain controls the action of the muscles of the body. Alcohol begins to show its effects by interfering with the finer movements of the muscles that are needed for acts of skill. It slows them up and makes them less accurate. Later on the alcohol affects other movements of the body, as shown in the staggering or unsteady walking of one who has taken enough alcohol to show signs of drunkenness.

Many experiments have been made in the United States and in foreign countries to find out how alcohol affects the skillful use of the muscles. The amount of alcohol used in these experiments is usually limited to that which would be taken into the body by an occasional or moderate drinker.

Typewriting and shooting at targets are activities which require very fast and accurate control of muscles and a close connection between the use of the muscles and the sense of sight. In typewriting tests that lasted for many days, it was found that the typists made more errors and worked more slowly after alcohol had been taken than when they were given no alcohol. In a test of shooting at tar-

gets in Bavaria, Germany, twenty expert gunners fired about twenty-seven thousand shots at targets that were placed over two hundred yards away from them. Practically all of them did poorer shooting after they had been given an alcoholic drink than when they tested their skill without alcohol.

### **Alcohol and Athletics:**

Games and athletic sports need quick thinking, good control of the muscles, and endurance (the ability to hold out until the end of the game). Athletes and the men who train them know that alcohol interferes with quick and accurate thinking, disturbs the fine control of muscles, and weakens strength and endurance.

#### **In Football**

Fielding Yost, famous coach at the University of Michigan, said:

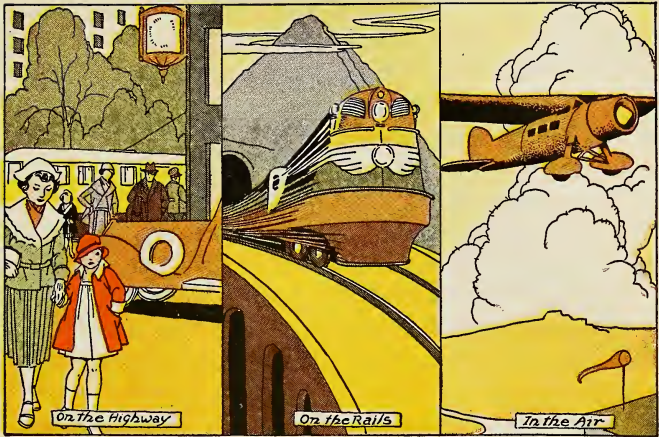
"Nothing tries a man's staying powers like football. I will not waste time trying to train a drinker."

#### **In Baseball**

Ty Cobb, leading batter for years in the American League, said:

"No nips for me. They dim my batting eye. No man who expects to succeed at baseball should ever think of taking strong drink."





*A clear brain and quick-acting muscles are needed — alcohol has no place here.*

### **Alcohol and Machinery:**

We live in what is sometimes called the Machine Age, because so many things are done by machines. It is also the age of speed, with new records frequently made on land, water, and in the air.

*Accidents:* Alcohol may be a cause of accidents in a number of ways. It affects the judgment of those who use it; it gives a false feeling of confidence which leads to carelessness with dangerous machines; it interferes with the quickness and accuracy of sight and the fine control of muscles.

*The Locomotive:* The railroads were among the first to see the dangers of alcohol to those who have

the lives of other people in their charge. They have long had a safety rule that the use of intoxicants by employees while on duty is prohibited. This rule also states that the use of intoxicating drinks or the visiting of places where they are sold is sufficient cause for dismissal.

*The Automobile:* Many automobile accidents can be traced to the harmful effects of alcohol. An automobile needs constant attention. If the driver's attention wanders away from his work or if there is any delay in attending to something that suddenly appears before the car, a serious accident may happen.

It has been found that it takes a normal person about one-fifth of a second to start putting on the brakes or turning the steering-wheel after seeing a sudden danger in front of the car. In this short time, the eye sees the object and the brain understands the danger and sends the necessary commands to the muscles to act. It has also been found by experiment that from two to four hours after taking as much alcohol as ordinarily found in a pint of beer or a glass of whiskey, this time is increased from one-fifth to two-fifths or three-fifths of a second. As an automobile going at thirty-five miles an hour will travel fifty feet in one second, you can see that a car will travel twenty feet in two-fifths of a second. This extra distance the car goes before the driver starts to put on the brakes or turn the

steering wheel may mean the difference between safety and a serious accident. Alcohol also gives the driver of an automobile a false feeling of confidence in his own ability. He does not realize that he is less able to meet sudden dangers than he was before he took the alcohol.

*In the Air:* Would you care to trust your life in an airplane to a pilot who had any of his powers or abilities dulled by a drink of alcoholic liquor? Of course you would not. If there is any place that seems to need quickness of judgment and quick action of finely trained muscles, it is in the air. Many airplane accidents have been traced to the use of alcohol.

Colonel Charles A. Lindbergh, America's greatest air hero, does not use alcoholic beverages of any kind and does not smoke. His food and drink on his famous flight across the Atlantic Ocean consisted of sandwiches and water.

### **Effects of Alcohol upon Mental Work:**

A number of experiments have been made to learn the effects of alcohol upon learning and memorizing things. One man experimented upon himself by learning twenty-five lines of a long poem each day for several months. He found that when he took a moderate amount of alcohol, it took longer to memorize a twenty-five line selection than when he did it without alcohol.

In an addition test in arithmetic, twenty seven-year-old students were divided into two groups of ten each, called Group A and Group B. Group A was found to be able to do a little better work than Group B at the beginning of the experiment. The students in Group A were given wine to drink while those in Group B received no wine. As a result Group A lost its advantage over Group B in the adding test and did poorer work.

An addition test in arithmetic was also carried on in a foreign country with a number of ten-year-old and fourteen-year-old boys and girls. These children were also tested in cancelling letters and in their skill in stringing beads. The tests extended over a ten-day vacation period. Every other day they were given a drink of raspberry juice and water mixed with the same proportion of alcohol that sweet wines contain. That is, they received alcohol on one day and then none the next day, and so on, until the end of the experiment. Some of the children were used to alcohol from drinking wine regularly in their homes, some drank wine only occasionally, and some had never used it. The person who had charge of the experiment reported that after taking the alcohol, the boys talked loudly and were rough in their behavior. The girls were also more talkative and showed more discomfort from the alcohol than the boys. The average work of every child was poorer on the days when alcohol was given

than on days when they had none to drink. The harmful effects of alcohol were shown also in another way. The experiment began with about one hundred children. Of these, about half of them were made so ill by the alcohol that they were unable to do the tests and had to be dropped out.

Other experiments have been made to show that alcohol weakens the powers of attention and of reasoning. There is plenty of evidence to show that even small amounts interfere with mental work. It lessens the power to think clearly and do accurate work.

### **Effects upon Family and Social Life:**

Some persons who have worked hard for many years to build up a successful business have had their work ruined by the use of alcoholic liquors. Drinkers are very likely to neglect their work. Their good judgment is dulled by alcohol so that they cannot carry on their business successfully. Alcohol dulls the ability to tell the difference between right and wrong and weakens the will power or the ability to say "No" when needed.

Alcohol is a cause of many troubles in family life. The drinker often neglects the home and family. Money that is needed for food, clothing, and other useful purposes is spent for alcoholic drinks. In these ways alcohol brings suffering and harm to those who do not use it. We often say that these persons are the innocent victims of its use.

Alcohol is one of the principal causes for the conditions which send large numbers of drinkers to hospitals, poorhouses, insane asylums, and prisons.

There should never be any question about how much or how little alcoholic liquor to use. *There is no safe amount.*

### **Tobacco Affects the Body**

Tobacco is a plant which was unknown to the civilized world before the middle of the 16th Century. About this time the early explorers found it in use among the American Indians and carried it back to Europe with them. Its use gradually spread until today its preparation and sale is a business involving hundreds of millions of dollars each year.

#### **A Poison in Tobacco:**

Tobacco contains a powerful poison called *nicotine*. A large part of the harm from smoking comes from the absorption of some of this nicotine into the body.

#### **Some Effects of Tobacco upon the Body:**

Tobacco smoke is quite warm and contains some carbon monoxide gas and other substances in addition to nicotine. Tobacco smoking is irritating to the delicate lining of the air passages. Its immoderate use often causes a "smoker's cough" and a hoarseness of the voice.



Tobacco makes the heart beat faster. Long continued and immoderate use is often the cause of a fluttering heart beat and pain in the region of the heart.

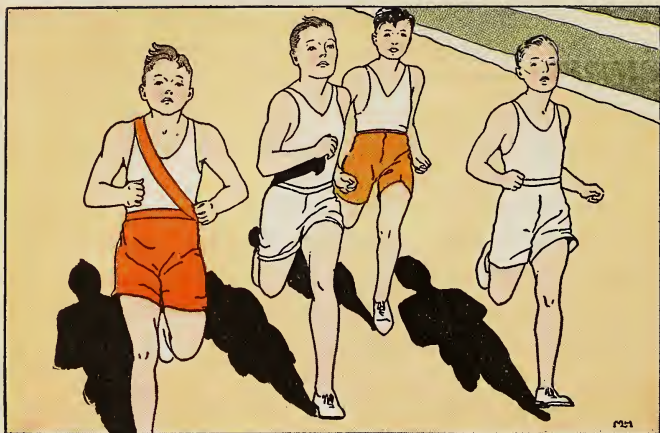
During the growing period of life, the use of tobacco is especially harmful.

Tobacco disturbs the nervous system. It may cause headaches, trembling, and nervousness. Its effects upon the nervous system extend to the control of muscles and make smoking very harmful to success in games and sports.

### **Athletes Are Forbidden to Smoke:**

Smoking lessens strength and endurance. The shortness of breath that results from the use of tobacco is a big handicap in lively games and sports. The control of muscles by the nervous system is disturbed. As a result the persons are not so alert or quick as before, and they cannot do things with as much skill. Tobacco handicaps its users when they match their strength and skill against those who do not use it.

A university professor found that only half as many smokers as non-smokers were successful in winning places on the college football teams. Smoking interferes so much with success in athletics that many coaches or trainers refuse to keep students on the teams if they use tobacco during the training and playing periods.



*Speed and endurance are needed. Tobacco interferes seriously with these.*

### **Tobacco Interferes with Mental Work:**

Many experiments have been made to find out the effects of tobacco on mental work such as learning and memorizing things and following directions. They have shown that tobacco affects both the speed and accuracy of mental work. Persons using tobacco were found to make more mistakes in adding figures than persons who did not use it. The users of tobacco also learned new things less easily and tired more quickly at their work than those who did not use it.

School marks show that smoking and successful school work do not go well together. In large num-

bers of cases the standings of pupils who began the use of tobacco have been found to drop below those of the non-smokers. In all these cases the pupils were equal in school work before the use of tobacco was begun.

The following report of one of these cases is representative of all others: "Last year W. A. was a good student, got his lessons at one reading, and made a good record. Last summer he began smoking moderately. This year there has been a decided drop in his standings and a considerable increase in effort required to get his work."

### **Many Employers Object to It:**

The boy who smokes is often handicapped in obtaining employment. His employer knows that loafing too often goes with smoking and that the poisonous nicotine will keep him from doing his best work.

Smoking is annoying to many people. The smoker carries the unpleasant tobacco smell about with him on his skin and in his clothes. Then there is also the danger of fire from the careless handling of matches, cigarette stumps, and the hot ashes of tobacco. All these things are very likely to turn a careful employer away from the user of tobacco in favor of the one who does not use it.

### **Counting the Costs of Smoking:**

It is easy to see that the money spent for tobacco is not the only cost that needs to be considered in

deciding for or against the use of tobacco. Its harm to the body, its interference with good school work, and its effects upon the character of the user are all costs which must be counted. The total costs are too great for a young person to begin its use before reaching full growth, and then it should be remembered that tobacco is not needed by the body at any time, for any purpose.

### **Some Other Harmful Drugs**

There are some persons who attempt to doctor themselves with patent medicines when they are not feeling well. Patent medicines are the ready-made kind that are sold to relieve pain, or to strengthen the body, to cure or prevent the diseases that are named on the label or in the advertisement about them. Patent medicines often contain alcohol or other narcotic drugs which help to relieve pain for a time, but does not aid in a cure. The use of patent medicines keeps persons from going to a physician who would be able to prescribe just the treatment they need. Often drugs are not needed at all. The continued use of patent medicines that contain narcotic drugs is dangerous for still other reasons. These drugs themselves may have a harmful effect, and narcotic drugs are habit-forming. Their continued use leads a person on to taking more and more of them until a habit or craving for them is formed. This craving or habit is hard to break.

Long ago it was the custom in many parts of the world to make slaves of the captives taken in war. These slaves worked for those who owned them and were often treated cruelly. This practice is no longer followed among civilized nations.

There is a form of slavery in the world today which might be considered as terrible or even worse than the slavery of old. It is the slavery to narcotic drugs, such as opium, morphine, cocaine, and heroin. These drugs are strongly habit-forming. The person who begins their use soon finds that more and more must be used to satisfy the demands of the body for the effects they cause. As a result, the user is a slave to drugs and will commit crimes, if necessary, to keep the body supplied with them.

The habit of using strong narcotic drugs sometimes develops from the continued use of patent medicines that contain habit-forming drugs. The body calls for more and more of the drug and the person takes larger and larger amounts to keep from suffering the pain that is caused when the nerve cells are deprived of the drug they have become accustomed to. Before the person realizes it, he has become a slave to the drug. When this occurs, he will steal, lie, or even kill, if necessary, to get the drug. He must keep the body supplied with it at all costs. You can easily see that it is about impossible for drug users to have much ambition, or even the ability, for doing worth-while things.

Persons may get into the drug habit by being in the company of others that use it. The person may be invited to try just a little, to do as the others do, or see how it feels. If this is repeated a few times, it will not be long before a strong habit is formed and the drug habit is one that is very, very hard to break. Never let a stranger get you to take a white powder just to try it. Persons who sell these drugs try to get others to use them a few times. They know that once you form the habit, you must keep right on using the drug. Drug addicts cannot cure themselves. They are usually treated in hospitals by physicians trained in this work.

## THINGS TO DO AND THINK ABOUT

### A. For Answer and Discussion:

1. Is alcohol a stimulant or a narcotic in its effects upon the body? In what ways does it affect the brain?

2. What are some of the effects of alcohol upon the things listed below? Try to give an illustration of these effects from some statement or experiment described in the text, or learned in other ways:

- a. Judgment and self-control.
- b. The feelings.
- c. Skill.
- d. Ability in games and sports.
- e. Use of machinery.
- f. Mental work.
- g. Family and social life.



3. How do the effects of tobacco show themselves upon the following things? Try to give an illustration of these effects from some statement or experiment described in the text, or learned in other ways:

- a. Ability in games and sports.
- b. Scholarship, or school work.
- c. Employment.

4. In discussing the use of tobacco, the effects upon young people and upon grown-ups are often considered separately. Why is this done? What are some of the effects of the immoderate use of tobacco upon persons at any age?

5. What are some of the dangers of using some patent medicines?

6. Why are narcotic drugs, such as morphine, cocaine, and heroin so dangerous to use?

### **B. For the Health Bulletin Board or Notebook:**

Post clippings that help to show the connection between the use of alcohol and accidents.

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## **OUR NEWS GATHERERS—THE SPECIAL SENSES**

In order to direct or control anything successfully, it is important to gather information of many kinds. The head of a business must know what is going on inside and outside his plant. In directing an army, the general must constantly receive messages that tell him of the positions of his own troops and those of the enemy. In our bodies the brain

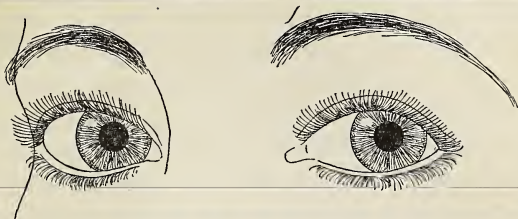
must be kept informed of what is going on round about us in order to direct and control our thought and actions. This information is collected by the senses of sight, hearing, touch, smell, and taste. The messages collected by these senses are carried to the brain by the sensory nerves. This information is useful in our thinking and acting. It makes it possible for the brain to send out the right commands to the muscles to protect us from dangers and to enable us to do the things we desire at work and play.

### **The Eyes and Sight**

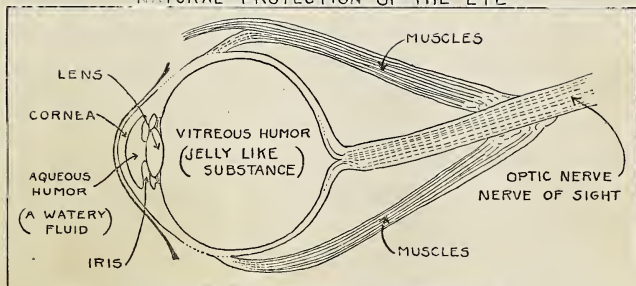
Our eyes are placed in a very good position to do their work, somewhat like the look-out on a ship. It is the duty of the look-out to keep watch over the water and report to the captain the things he sees. In order to do his work best, the look-out is placed in the front of the boat and often up high above the deck so that he can see long distances. Our eyes are placed so that they can see to the front in the direction we move when we walk or run. They are also placed quite high up in the body—in the head—which enables them to see as far as possible around us.

### **The Work of Seeing:**

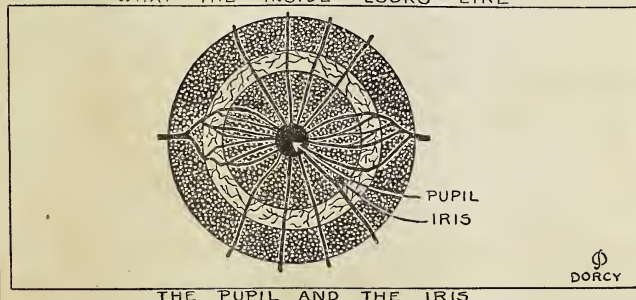
Lights, shadows, and colors are the things we see with our eyes. We cannot see when there is no light. In the darkness we have to depend upon some



NATURAL PROTECTION OF THE EYE



WHAT THE INSIDE LOOKS LIKE



THE PUPIL AND THE IRIS

DORCY

*The eye has a number of parts which help us to see.*

of our other senses to give us information about the things around us. A camera, like the eye, depends upon the light for its pictures. As the eye and the camera are alike in many of the ways they do their work, they are often compared with each other.

The eyeball is the camera box of the eye. It is a soft ball-shaped body, about an inch in diameter. It is located in a hollow socket in the bones of the skull and is moved about by six different muscles that are attached to it. The interior of the eyeball is filled with a clear, colorless liquid that helps to keep the eyeball in its proper shape. The eye also contains a number of delicate parts that enable us to take the picture.

If you will look at your own eyes in a mirror or look at another person's eyes, you will see two of the finest "cameras" in the world. Our eyes can take "still" and motion pictures in their actual colors better than the finest manufactured cameras.

As you look at your eyes in a mirror, the first thing you are likely to notice is the colored part, called the iris. This iris is a little curtain stretched across the front of the eye. The color of the eyes, blue, or brown, or gray, is due to the color of the iris. Right in the center of the eye you will notice a round, black spot. From other lessons on the eye in earlier grades you have learned that this is really a hole in the center of the iris, called the pupil. The iris serves as a shutter for the eye and regulates

the amount of light that enters. When the light is bright, the pupil becomes smaller. When the light is dim, the pupil becomes larger in order to let as much light as possible into the eye. The pupil is black because the part you see is the black, middle coat of the eye showing through the opening in the iris. The eye also has two other coats, or coverings. The outer coat is tough and helps to protect the eye from injury. It forms what we call the white of the eye. This outer coat is more rounded right in front, and becomes the cornea, or window of the eye. The inner coat, called the retina, contains the nerves of sight. See the drawing on page 253.

The lens of the eye is located back of the iris. It is the work of this soft, clear, rounded body to bend the rays of light that enter the eye, so that they will be brought to a point, or focus, upon the retina. In order to take a clear, distinct picture with a camera, it is necessary to have it in the proper focus upon the film or plate. This is done by moving the lens forward or backward, as needed. In the eye the proper focus is obtained by a change in the shape of the lens. Because of muscles attached to it, the lens becomes thicker, or thinner, as may be needed to focus the rays of light upon the retina.

When light falls upon the sensitive retina at the back of the eye, messages are carried by the optic nerve to the brain. In the brain these messages are received and interpreted, and we *see* the object.

## When Glasses Are Needed:

If the eyeball is not shaped correctly, or the lens does not work properly, we may have trouble seeing distant or near objects clearly and distinctly. Since the eye must work harder to bring the rays of light to a focus upon the retina, eyestrain results. If the defects are severe, we may not be able to see objects clearly at all that are near-by or far away.

Eyestrain may show itself in a number of ways. The eyes may burn or feel very tired or strained after using them for close work. At times the letters on the pages of a book or paper may look blurred or appear to dance before the eyes. Spots may appear before the eyes. When these signs of eyestrain or any other unusual conditions are noticed, you should go to an oculist for examination and treatment. It may be that glasses are needed to assist the eyes with their work. When this help is provided, we see clearly and distinctly without extra effort and the effects of the eyestrain disappear. If you need glasses, get them promptly and wear them. If you continue to strain the eyes, the defect will likely become worse. Persons who examine eyes and make and sell glasses for them are known by a number of different names. An oculist or ophthalmologist is a physician who has made a special study of the eyes. An optometrist is a person (not a physician) who tests eyesight and prescribes glasses to correct



defects. An optician is a person who makes glasses to correct eye defects.

### **Protecting the Eyes:**

Our eyes have several natural protectors. The bony socket in which the eyeball is located is a protection for it. The eyelids protect the eyes by closing over them when there is danger of getting something into them. The eyebrows and eyelashes are hairs that help to keep things out of the eyes. The tears wash down over the surface of the eyes and carry off dust, dirt, and germs. The moisture of the tears flows away through tiny tubes that lead from the inner corner of each eye into the nose. When the liquid is produced by the tear glands too fast to be carried off by these tubes, they form tears.

*A Good Light and a Good Position Are Important:* The best light for the eyes is one that is neither too bright nor too dim. When a light is too bright it causes a harmful glare. Light should never be allowed to shine directly into the eyes from a bright unshaded lamp or to be reflected directly into them from the pages of a book or a polished table. When you read or write, it is best to have the light shine over the left shoulder from a lamp that is placed a little higher than the head. Attempting to read or sew in a dim light strains the eyes by forcing them to do extra work in trying to see something that is not very clear.



### PROTECT THE EYESIGHT

Moving cars are poor places to read. The jolting makes the eyes do extra work to keep the focus. This will strain the eyes.

Lying down is another poor position for reading or sewing. The eyes soon become strained because of the extra work they have to do in order to see distinctly.

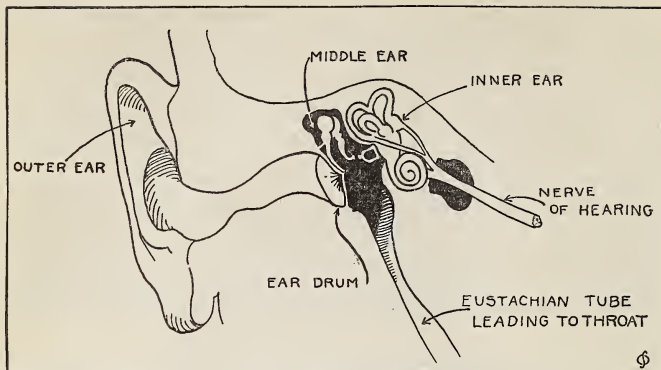
*Rest the Eyes.* When the eyes become too tired from reading, writing, sewing, or other close work, it will rest them to look away from the work for a short time. This changes the focus and rests the muscles of the eyes.

Extra rest for the eyes is needed when persons are ill or are recovering from such diseases as measles, scarlet fever, and diphtheria. Be sure to do all the doctor tells you at such times so that you will not injure the eyes by straining them while they are in a weakened condition.

*Prevent Infections:* Eye diseases are sometimes spread by using towels and wash basins in public places. It is safest to use only the paper towels that can be thrown away when you finish with them. In the home, have your own personal towel and wash cloth. Persons with sore or infected eyes should take extra precautions to keep from spreading the disease to others. Towels and washcloths should be boiled when they become soiled in order to clean them thoroughly and to kill germs that may be on them.

When anything gets into the eye, care should be taken to prevent infecting it while the object is being removed. Any person who touches the eye should first wash the hands. He should use only pieces of clean gauze or other clean materials to remove the object. While waiting to have the speck removed, do not rub the eye. This may force the particle deeper into the delicate surface of the eye or may infect it from the fingers. A bit of dirt can sometimes be removed by pulling the upper lid down over the lower one. The tears that flow freely may wash it away. If this is not successful, go to some one who knows how to remove it without infecting the eye.

*Care with Sharp Pointed Objects.* Keep sharp pointed objects away from the eyes. Do not throw things carelessly about. Be careful with scissors and sharp pointed toys. Do not walk about in the



*The ear is very delicate. It needs good care at all times.*

dark without taking care to protect the eyes from injury.

### **The Ears and Hearing**

It is through the sense of hearing that we learn of sounds. Hearing is very useful to us. Through it we gain information and also enjoy the pleasures of music and the conversation of our friends.

Our ears are very delicate parts of the body. The part we see is only a small portion of the whole ear. There are two other important parts, the middle ear and the inner ear, hidden away and securely protected by the bones of the skull.

#### **How We Hear:**

When a bell is struck, waves go out into the air in all directions from the bell, just as waves go out

through a pool of water from a stone that is thrown into it.

It is the work of the outer ear to gather in some of these sound waves and start them on their journey through the other parts. These waves pass in through the tube-like portion of the outer ear and strike the eardrum. The eardrum is an elastic membrane which separates the outer ear from the middle ear, as shown in the drawing on page 260.

The middle ear is a little air-filled cavity between the outer and inner parts of the ear. The eardrum separates it from the outer ear, and another elastic membrane separates it from the inner ear. A chain of three little bones extends across the middle ear connecting these two membranes. When the eardrum is set in motion by the sound waves that strike it, the motion is carried by the movements of the three little bones across to the membrane which separates the middle ear from the inner ear.

The inner ear is shaped somewhat like a snail shell. The endings of the nerves of hearing float in the liquid which fills these winding canals. When the inner membrane is set in motion, it sends waves through this liquid which affect the nerves of hearing. These messages are carried to the brain and we hear the sounds that caused them.

### **Gentle Treatment Is Best:**

From this brief description of how we hear, we learn that our ears are very fine and delicate instru-





*Never neglect any kind of ear trouble. Go to see a physician at once.*

ments. They must be carefully treated to prevent injuring them.

Blows upon the ear and very loud noises should be avoided. They are likely to drive air into the ear with force enough to injure the eardrum. Pulling the ear is a dangerous way to treat such a delicate instrument.

Things should not be pushed into the canal of the outer ear. Care should be taken to clean the outer ear in a gentle way. The wax that forms in the canal is useful in preventing dust and insects from getting into the ear. Extra wax can be removed by





*Other useful ways of telling what is going on round about us.*

covering the end of the little finger with a handkerchief or towel, and cleaning gently. Keep match sticks, tooth picks, and other hard things out of the ear. These things may injure the delicate eardrum. If too much wax collects in the ears and affects the hearing, go to a physician and have it removed in a safe and proper way.

### **Prevent Infections:**

The middle ear is filled with air. This air enters through the Eustachian tube which leads from the

back part of the mouth into the ear. When a person has a cold, some of the matter in the nose and throat may be forced up this tube, resulting in an infection of the middle ear. This infection may spread outward, causing a discharging ear. If it spreads inward, it leads to very serious trouble, sometimes to fatal results. Infection of the middle ear is one of the frequent causes of deafness. Blowing the nose gently will help to prevent infection of the middle ear. Blow one nostril at a time, holding the other closed with a finger. This method of blowing the nose is especially desirable when you have a cold or nose infection. It will prevent the forcing of infection up the Eustachian tube into the ears.

Ear troubles of any kind should never be neglected. Go to a physician at once for treatment whenever you have an earache or any other sign of trouble with the ears.

### Tasting and Smelling

We can get enjoyment from the senses of taste and smell. The taste of fruits or well cooked foods is made possible by the taste buds that are located principally on the back of our tongue. These buds are the places where the nerves of taste are located. We can really taste only four kinds of things—sweet, sour, bitter, and salty. Other tastes, such as that of an onion or a piece of apple, are principally due to the sense of smell. You can notice this when

you have a cold and the nerve endings of the sense of smell in the nose are dulled by the effects of this disease.

Taste and smell are also important for the information they bring us about possible dangers. Spoiled food usually has a taste which warns us against eating it. The smell of gas is a warning to us to get away from it into the fresh air at once.

The sense of smell in animals is usually much stronger than in human beings. A dog can locate his master in a crowd by sniffing about until he finds him.

### **The Sense of Touch and Temperature**

The sense of touch makes us able to tell whether things are hard or soft, or rough or smooth. The nerve endings of the sense of touch are located in the inner layer of the skin. They are distributed over the whole body. The sense of touch is used by blind persons to do many things that we do with the sense of sight. The books for the blind have raised letters which are read by touching them.

The sense of temperature makes us able to tell whether things are hot or cold. There are some nerve endings in the inner layer of the skin which are affected by heat, and other nerve endings which are affected by cold. This sense is very useful in warning us of dangers from things that are very hot or very cold.

## THINGS TO DO AND THINK ABOUT

### A. For Answer and Discussion:

1. Describe the work of the eye in seeing.
2. What are some of the signs of eyestrain?
3. Why do some persons need to wear glasses?  
How can they find out that they are needed?
4. How are the eyes protected naturally?
5. How may we protect our eyes in connection with each of the following:
  - (a) The amount of light.
  - (b) The position of the light.
  - (c) When on a moving vehicle.
  - (d) When lying down.
6. What precautions should be taken when a speck of dust or dirt gets into the eye?
7. Describe the work of the ears in hearing.
8. What is meant by the suggestion to treat the ears gently at all times? How can this be done?
9. How can the middle ear become infected?  
How can this be prevented?
10. What are some of the harmful results that may follow an infection of the middle ear?
11. What is meant by the sense of taste? Where is it located?
12. What is meant by the sense of smell? Where is it located?
13. What is meant by the sense of touch? Where is it located?
14. What is meant by the sense of temperature?  
Where is it located?

**B. Matching Statements:**

Complete the statement in column I by finding the correct ending in column II. Do not write anything in this book. Write the complete sentences on a separate sheet of paper or in your health notebook:

*Column I*

1. The eyes are organs of
2. The tears are
3. Glasses are often needed
4. The skin is connected with
5. The ears are organs of
6. Moving cars are
7. Deafness is frequently caused by
8. The nose is connected with
9. It is restful to the eyes
10. The tongue is connected with
11. The pupil of the eye is
12. Blowing the nose properly

*Column II*

- (a) the sense of smell
- (b) harmful places to read
- (c) to look up from a book from time to time
- (d) the sense of taste
- (e) helps to prevent deafness
- (f) to relieve eyestrain
- (g) the senses of touch and temperature
- (h) natural protectors of the eyes
- (i) a hole in the center of the iris
- (j) sense of sight
- (k) infections of the middle ear
- (l) the sense of hearing

## UNIT VI

### SAFETY AND FIRST AID

#### Habits of Safety

Brightly colored electric signs light up our streets at night in a very attractive way. Many of these signs flash on and off, changing their design and colors to attract our attention.

What a useful thing it would be if some form of brilliant sign would flash in front of us whenever we are in danger! For example, when a ball rolls into the street, a sign might flash:

***BE CAREFUL—***

***LOOK UP AND DOWN THE STREET***

or, when you use a ladder, there would be a flash:

***BE CAREFUL—DON'T LEAN TOO FAR***

or, when you cross the street, flash:

***STOP—LOOK IN ALL DIRECTIONS***

Real signs are posted at many street corners and railroad crossings to warn us of dangers at these places. At other dangerous places, our safety may depend upon the flashing of a warning signal in our minds. Good safety habits help us to be careful when in danger, and make it easier for us to do the things

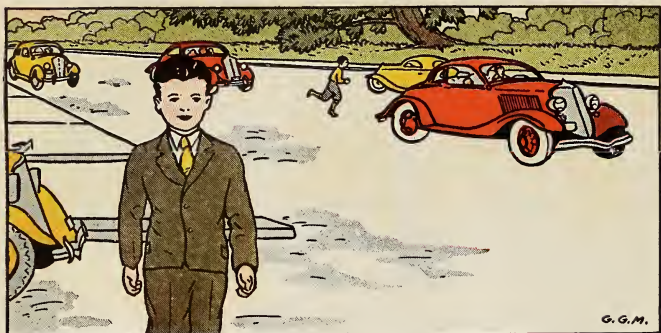


which will help to prevent accidents. When safety is made a *habit*, the safe things *do themselves* when they are needed. For example, you may be walking along a street, talking with a friend. When you come to a street crossing, if the proper habit is strong enough, you stop, look up and down the street, and go across when it is safe to do so without more than a moment's pause in your conversation. This safety habit is a time saver and often a life saver.

Good habits of living help to prevent accidents. A clear mind makes it easier to tell when danger is near, and quick acting muscles help to get you safely out of a dangerous place. A tired person is more likely to be injured than one who is rested and wide awake.

Some accidents are unavoidable, such as those that are caused by a severe storm. Others are due to ignorance. A baby does not know all the dangers of playing with fire or with the handles on a gas stove. A very large number of accidents result from carelessness. A person forgets to look about carefully at a street crossing, an automobile driver is careless in passing another car, or a person leans too far out of a window; and a serious accident may be the result. A better understanding of the dangers around us and habits which make us more watchful will help to lessen all kinds of accidents.

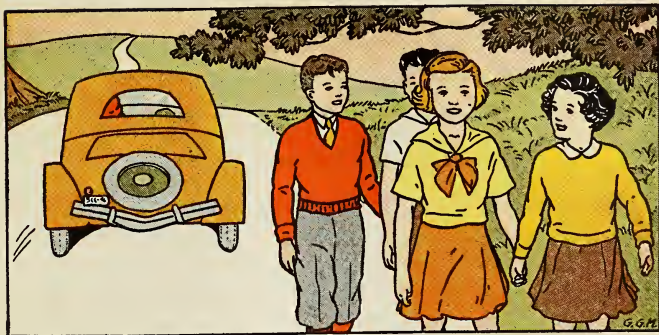
The accidents due to the use of alcohol could be



***WALK STRAIGHT ACROSS—DO NOT “JAY-WALK”***

greatly lessened if persons only realized the dulling, or deadening, effects it has upon the brain and nervous system. These effects have been described on pages 241-243. Even small amounts of alcohol affect the action of the nerve cells and cause a person to think that he can do things that he really is in no condition to do. The use of alcohol is connected directly with many automobile accidents and accidents around machinery in factories, mills, and other places.

The need of safety education for people of all ages is so great that a number of organizations are engaged in it. Much valuable educational work is done by state police and automobile clubs. The National Safety Council, with offices in New York City, collects information about all kinds of accidents. The Council publishes booklets, plays, and posters about



### WALK TO THE LEFT—FACING THE TRAFFIC

safety. Some of these are free and others are sold at small cost. It also publishes the *Safety Education Magazine*, which brings a wealth of good stories and suggestions to teachers, pupils, and parents each month during the school year. Some of the statements in this unit about accidents and a few of the illustrations that go with them have been taken from a book called "Accident Facts," which is published each year by the National Safety Council.

### What Habits Are Needed:

In an earlier grade, we learned that in recent years, about one-third of the deaths resulting from accident were due to motor vehicles (automobiles, buses, and trucks). Another third occurred in and about the home. The remaining third were rather evenly divided between public accidents (railroad,

street car, fires, drowning) and occupational accidents. This shows that care is needed practically everywhere—on the street, at home, in school, at play, and at work.

### **Street and Highway Safety**

Many kinds of accidents may happen to persons on the streets and highways. Most of them are connected in some way with the automobiles, trucks, and buses. During the last twenty years, the number of deaths from motor vehicle accidents has been steadily going up, while during the same period the number of deaths from all other accidents has decreased.

#### **Safety in Connection with Vehicles:**

There are a number of safety habits that should flash like warning signs to keep us out of danger from vehicles on streets and highways. Some of these are reviewed below. Check your own safety habits with them.

#### ***ALWAYS CROSS AT CROSSINGS***

Busy crossings often have traffic signs and traffic officers to make it safer for you to cross at these places. The drivers of automobiles are more likely to be looking for you at a regular crossing. Cross street and railroad crossings cautiously.

State highway departments and town and city governments are continually studying traffic prob-

lems. They enforce speed limits. They mark off safety zones and put up warning signs where needed. They keep records of accidents in order to discover the most dangerous locations and plan to make them safer. Remember that the traffic officers and traffic signals are good friends. Obey them cheerfully. Look about you as you cross a street. Go straight across to the nearest corner, and not diagonally across. Be careful not to go suddenly into the street from behind a parked car or a standing trolley.

### ***WALK TO THE LEFT FACING THE TRAFFIC***

When you walk along a road, where there are no sidewalks, walk to the left, facing the traffic. This will make it possible to see the cars that come toward you and help you to keep out of their way.

### ***WAIT UNTIL THE CAR STOPS***

Wait until the train, trolley, bus, or any other moving vehicle has come to a full stop before stepping off. If you face forward as you get off, you will be better able to protect yourself from a fall that might be caused by an unexpected movement of the car.

This same precaution applies also to getting on a car. Persons who try to get on or off a moving vehicle are in great danger of being thrown under the wheels.

### *PLAY SAFELY*

Streets are not safe places to play games or roller skate. The sidewalk is a much safer place to skate and play.

Catching on the back of vehicles in the street or stealing rides is so dangerous that it is forbidden by law in many places. What is the law about it in your town or city? There is danger from falling off and also from being struck by another vehicle on the street.

Ride a bicycle carefully. Keep close to the curb on the right side of the road. Use your hand or arm to show drivers back of you when you are going to cross to the other side of the street, turn a corner, or stop. Be careful not to run into persons who are walking.

### **Be Careful around Street Repairs and Building Operations:**

Openings in the streets are made to lay pipes for water, gas, sewage, or telephone service. When streets are repaired, machines and materials often have to be left out overnight. It is dangerous to play around openings in the streets or the machinery or materials on them. Keep away from them in order to avoid dangerous falls, cuts, and bruises.

Keep away from places where cellars are being dug and buildings put up. Climbing in unfinished



or vacant buildings may result in a fall, and a cut, bruise, or broken bone. Sharps ends of boards or nails sticking up in them are also found in these places, and may pierce the skin or injure the eyes.

### **Keep Out of Rubbish and Ash Containers:**

When persons go through rubbish and ash cans to gather things that have been thrown away, they usually scatter the waste materials around and take chances of seriously injuring themselves. There are often bits of broken glass and tin cans with sharp edges mixed in with the rubbish. A cut from these things is very dangerous because of dirt and germs on them.

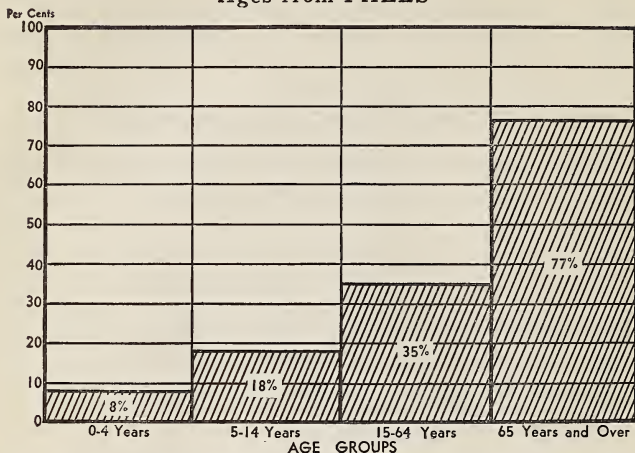
### **Let Broken Wires Alone:**

When a wire has broken or blown down, it is safest to let it alone. It may be carrying electricity. The best thing to do is to notify a policeman or other grown-up person, and have an experienced person take care of it without injury to himself or others.

### **Dangers from Cigarette Stumps:**

Some boys have been known to pick up the unused ends of cigarettes and smoke them. This is a filthy and dangerous thing to do. The person who first had the cigarette in his mouth may have had a disease of some kind. Boys who do this cannot be thinking of the chances they take, or else they surely would not do it.

*Per Cent of Fatal Home Accidents at Different  
Ages from FALLS*



*Read the Graph as Follows: Among children under five years of age, 8% of the fatal home accidents in this age group resulted from falls. Among persons between five and fourteen years, 18% of the fatal home accidents in this age group resulted from falls.*

### Safety in and about the Home

Many accidents occur in and about the home from burns, falls, gas and other poisonous substances, knives, sharp-pointed articles, guns, and other things. The most frequent causes of accidents in the home have been found to change somewhat at different ages. This can be illustrated by falls, which is a cause of many home accidents.

## **To Prevent Falls:**

The diagram on page 276 shows, that in a recent year, the fatal home accidents due to falls increased steadily as persons grew older. This would be somewhat expected because falls that are not serious to young children often prove fatal to older persons.

A number of things can be done to prevent falls. Be careful in climbing. When you use a stepladder be sure it is strong enough to support your weight. Place it properly, with the four legs firmly on the ground or floor, and set the braces firmly. Do not reach too far or lean too far to the side, as it is easy to lose the balance.

It is easy to lean too far out of a window unless you are careful. It is safest not to climb on roofs, among the rafters of a barn, or too high in trees. There is danger of losing your balance or of supports breaking and throwing you to the ground.

Keep things in their proper places. Falls are easily caused by tripping over something you did not expect to be in your way, especially in the dark.

Try to prevent falls on slippery places. Put ashes or sand on icy steps and pavements. Wipe up spilled water, oil, and grease. Small rugs on slippery waxed floors are a cause of many falls. Stairs are dangerous places to make slippery with wax. Use stairs properly by walking on them rather than running and jumping and sliding down the banisters.

Be especially careful with knives, scissors, and



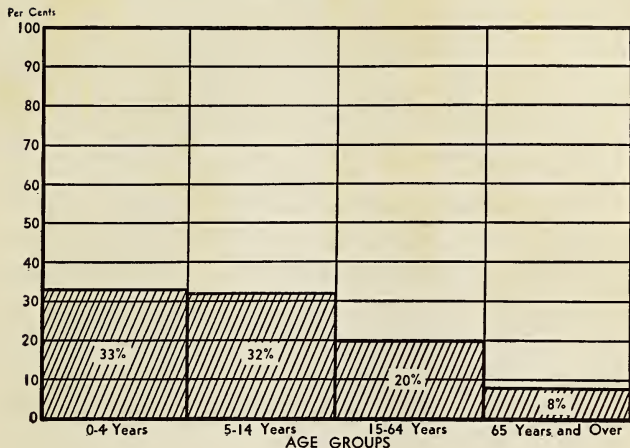
### TO PREVENT FALLS

other sharp-pointed things. It is dangerous to climb with them in your hands or pockets. Remove nails from boards or bend them over, before you throw the boards away. It is especially important to do this if there are smaller children around who might fall on a nail or step on one and receive a serious injury.

### Dangers from Fire:

Burns form another common injury in the home. As shown in the diagram on page 279, it has been found that the fatal home accidents from burns decrease steadily as persons grow older. Fire was connected in some way with about one out of every three fatal home accidents up to the age of fourteen. Between the ages of fifteen and sixty-four, it was a cause of one out of each five fatal home accidents,

*Per Cent of Fatal Home Accidents at Different  
Ages from BURNS*



*Read the Graph as Follows: Among children under five years of age, 33% of the fatal home accidents in this age group resulted from burns. Among persons between five and fourteen years, 32% of the fatal home accidents resulted from burns.*

and was reduced to one out of twelve, for persons 65 years and over.

Burns are very painful injuries, and when large areas of the skin are burned, they often prove fatal. Everyone in the home should take precautions to prevent fires, for they may spread quickly when they once get started.

Avoid playing with matches or with fire. Keep

away from bonfires. Any pleasure that comes from playing with fire does not begin to make up for the risks that go with it.

Gasoline and benzine often explode without actually touching a flame, because of the fumes that come from them. Store these dangerous substances *out of doors* and keep them *tightly corked*.

Always put out the flame in kerosene and gasoline lamps and stoves before filling them. Never pour kerosene or gasoline on a fire to make it burn faster. Many fatal accidents have resulted from doing this.

Use electric lights and electric appliances such as irons, vacuum cleaners, fans, pumps, and motors with care. Be sure to turn off electric irons when you have finished with them, or they will become overheated and may cause a fire. Electric appliances are more dangerous when your hands are wet. Never try to repair electric appliances while the current is on.

Fireworks are sometimes a cause of painful burns. Take care to prevent a firecracker from exploding in your hand or near your face or eyes. Fireworks are safest when they are set off by a person who is expert in handling them. Others can enjoy them by looking on at a safe distance.

Guns and pistols can cause dangerous burns from the powder as well as injuries from their bullets. It is not safe even to use blanks in a pistol, on ac-



count of the burns that may come from them. It is safest to let guns and pistols alone. Many people have been accidentally killed by guns that they did not know were loaded. When accidents occur from fireworks or firearms, go to a physician for treatment so that he can give the protection against tetanus, or lock-jaw, if he believes it is needed.

### Safety In and About the School

Records of accidents to school children that were kept for a period of six years showed that about one out of three occurred on the school grounds or in the school building.

A number of the accidents inside the building take place on the stairs. Walk carefully and use the hand rails that are placed there for your safety. The gymnasium is another place where a number of accidents happen. Use the apparatus properly, and do not take dares or any other unnecessary chances. Rubber soled shoes will help you to prevent falls.

On the school grounds the older children should set an example for the younger ones by acting in ways that will prevent harm to others. Rough play may cause persons to fall and be badly injured. Never run with a pen or pencil or taffy stick in your mouth.

Throwing balls, sticks, or other objects in a school yard where there are a number of children is dan-

gerous. It is not possible for everyone to keep watch upon the ball or any other thing that is tossed about.

Prevent falls by putting fruit skins and other forms of rubbish in the cans that are there for them.

Obey all rules of the fire drills. A fire drill should be quiet, quick, and orderly. It is not necessary to run in order to be quick. Rapid walking will get everyone out of the building in a very short time if all will do what is expected of them. There are greater dangers, at times, from panic and confusion than from an actual fire.

### **Safe Vacations:**

A vacation might be considered in the same way as a bank account. Money placed in a bank earns interest for us. We get more money out than we put in. A vacation, properly used, should pay us interest in the form of added health and vigor.

There are many places where a happy, healthful vacation may be spent, at home, at the seashore, in the mountains, or by the shores of a lake. If we live in a city, a visit to the country will be a vacation for us, and if we live in the country, a visit to a city will be a pleasant change. No matter when we go, or what we do, we should take care to have a safe vacation. We may know about all the dangerous places in and around our home, but we should be more careful than usual in a strange or unfamiliar place.

Many people like to spend vacations where *swimming* can be enjoyed. When you swim, it is safest not to go into the water right after a meal or when you are greatly overheated. These precautions are useful in preventing cramps which cause so many persons to drown each year. As you would expect, about two-thirds of the deaths from drowning occur during the months of May, June, July, and August, when it is pleasant to be out of doors in nearly all parts of America. When you dive, be very sure that the water is deep enough and that there are no rocks or sunken logs on which you might strike your head. The first aid treatment for drowning is given later in this unit, on pages 290-293.

*Sunburn* can spoil a person's vacation for a time unless care is taken to prevent it. Expose the skin to the sun only for a short time at first in order to prevent it from becoming too red and inflamed. As the skin gradually becomes accustomed to the sun, you can stay out in it for a longer time each day. In a short time, a tan or brown appearance results, and the dangers from sunburn are over for a while.

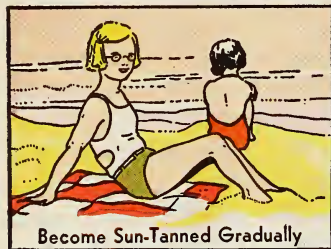
Everyone should be able to recognize *poison ivy* so that it can be avoided. Poison ivy is a plant with groups of three shining leaves. It is usually found climbing on fences and low bushes along the roadsides and in the woods. Poison ivy contains a substance which is very irritating to the skin of many people. It causes a rash or blisters on the skin, and



Enjoy Your Swim, but Swim  
with Care



Know the Depth of the Water  
Before You Dive



Become Sun-Tanned Gradually



Keep Away from Poison Ivy

### VACATION SAFETY

gives much annoyance and suffering from the itching it produces. Severe cases are often quite dangerous. Washing the hands or other parts that have been exposed to poison ivy with a strong soap will sometimes help to prevent the rash from developing.

Let unknown berries alone. There are some berries that are poisonous or upsetting to the digestive system when they are eaten.

When you go on *hikes*, be careful on the highways to prevent being injured by the traffic. Walk to the left, facing the traffic, when there are no sidewalks.

Put out *camp fires* so thoroughly with water or

sand that they will not be able to burn up again after you have left them, and start a forest fire. The dangers from forest fires are so great that some states do not allow fires to be made by campers except in places especially set apart for the purpose or unless a licensed guide is with them. What are the regulations in your state?

In the winter, *skating* and *sledding* are fine winter sports for after school or a week-end holiday. Make sure the ice is strong enough to bear your weight, and do not take dares on thin ice. Select a safe place to use your sled, so that you will not be injured by a collision with an automobile or other vehicle in your path.

### First Aid for the Injured

Injuries from accidents may be trifling, or they may be severe. A fall may cause an ankle to turn slightly with no tearing of muscles or ligaments. After a short time, it is as well as ever. A fall at another time may result in a bad sprain or a broken bone. These serious injuries require the services of a physician to care for the torn or broken parts. If the injured person happens to be on a camping trip or some distance from a doctor, the kind of first aid treatment that is given will have much to do with his comfort and the seriousness of the injury. Wrong or careless treatment may often make the injury worse.

Try to keep calm and cool when an accident occurs and you will be able to do more for the injured person. Be ready for emergencies by knowing what to do when they occur and how to do it. In first aid work, practice in doing the proper things is one of the best ways to learn to do them. In first aid classes, persons pretend they are injured in certain ways, and the others take turns in giving the proper treatment.

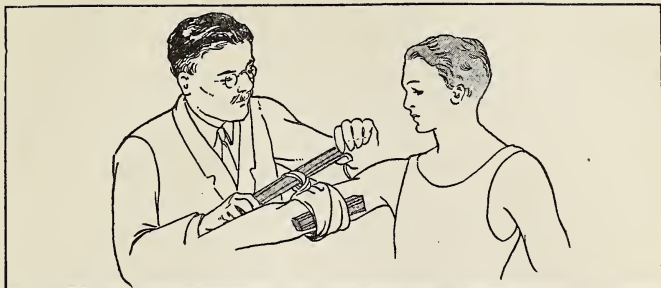
### **Injuries to the Skin:**

Our skin is a useful protective covering. It is rather tough and can stand hard usage and wear, but it is sometimes cut or pierced by sharp instruments, scraped off by falls, or damaged by burns.

*Cuts and Wounds:* Breaks in the skin make it possible for dirt and disease germs to enter the body. In order to prevent this danger, wash the cut thoroughly to remove the dirt, and then apply iodine or other germ-killing substance to kill the germs. If a bandage is needed to keep dirt from getting into the wound, put it on loosely. Use only clean, sterile (germ-free) materials for this purpose.

*Bleeding:* Slight bleeding from cuts usually checks itself by normal clotting. When the blood that escapes from a cut comes in contact with the air, it slowly changes into a thick, sticky mass, or clot, which stops the flow of blood. In cases of very severe bleeding, when an artery or vein is cut, first





*APPLYING A TOURNIQUET TO STOP BLEEDING*

aid treatment is needed at once to prevent a serious loss of blood.

When an artery or vein is cut, the application of a tourniquet is often needed to stop the flow of blood. A tourniquet, such as shown in the drawing above, consists of a band that is placed around the arm or leg and twisted tightly with the aid of a stick that is pushed under the band. The twisting of the stick tightens the band and stops the flow of blood.

A very important thing in connection with a tourniquet is to know where to place it. When an artery is cut, the blood is bright red and comes out in jets, or spurts. In order to stop bleeding from an artery, the tourniquet must be placed over the blood vessel between the cut and the heart, as blood in the arteries is on its way from the heart out to the different parts of the body. When a vein is cut,

the blood is dark red, or purplish, and flows out steadily. In order to stop bleeding from a vein, the tourniquet must be placed over the blood vessel, between the cut and the extremities of the body. This will be the side of the cut away from the heart, for the blood in veins is on its way back to the heart, after its journey around the body.

The value of a tourniquet is increased by placing a pad under the band, and right over the blood vessel through which the blood is escaping. When it is necessary to use a tourniquet for some time, the band should be loosened a little about every fifteen minutes. This allows the blood to circulate in the parts from which it is shut off by the tight pressure of the band.

*Burns:* When the skin is burned by fire or scalded by very hot water or steam, the outer protective layer is often destroyed, leaving the sensitive nerves in the inner layer exposed to the air. This makes burns very painful. In order to relieve this pain, cover the injured part with baking soda or vaseline. If you have a good commercial or patented preparation to put on burns, it should be promptly used.

Do not permit bandages to stick to a burn. These will cause great pain and will damage tissues when they are removed. When burns are severe, get medical aid at once, as the shock and after-effects may be dangerous to the person's life.

When clothing catches fire, lie down quickly and roll up in a blanket, rug, or large coat if these can be obtained. Lying down will help to keep the flames away from your face, and the blanket will smother the fire. If you cannot get anything to wrap around you, it will help to roll over and over slowly to smother the flames. The worst thing is to run, as this will fan the flames and make them burn faster.

### **Accidents to the Air Supply:**

Such accidents as drowning and gas poisoning prevent the body from getting a constant supply of the oxygen it needs. At such times it is necessary to act quickly if a life is to be saved.

*Drowning* causes death by suffocation, or shutting off the air supply. Water closes the windpipe or may even enter the lungs. This shuts off the supply of air. The body cannot get the oxygen it needs, and unconsciousness results. Death will soon follow unless the victim is rescued in time and artificial respiration is carried on long enough to restore normal breathing.

In giving first aid, place the unconscious person face downward and lift the body in the middle so that any water in the body may run out. See that the tongue is not blocking the air passages. Begin artificial breathing at once. A good method of artificial breathing is described and illustrated on pages 290-293.

*Gas poisoning* causes death by preventing the body from getting the oxygen it needs. In its place the blood takes up from the lungs another gas which harms rather than helps the body. When gas poisoning occurs, get the person into the fresh air as quickly as possible. If breathing has stopped, begin artificial respiration at once.

One of the most dangerous gases that gets into the air we breathe is called *carbón monoxide*. This dangerous gas forms a large part of the manufactured gas we use for lighting, cooking, and heating. Be careful to prevent leaks in gas stoves and hose connections. The exhaust from automobiles contains large amounts of carbon monoxide. Out of doors this gas is not so harmful. In small closed garages it is deadly. The garage door should always be kept open when the engine is running. Be sure to fasten the door open so it cannot accidentally blow shut.

*Breathing or Artificial Respiration:* The Shaefer method of artificial respiration recommended by the United States Bureau of Mines, the American Red Cross Society, and other organizations, is described below:

1. Lay the patient face down, one arm extended directly over the head, the other bent at the elbow. Turn the face outward and rest it on hand or forearm so that the nose and mouth are free for breathing. Figure 1, page 292.

2. Kneel, straddling the patient's thighs with your knees placed a little below the hip bones as shown in Figure 1.

Place the palms of the hands on the small of the back with fingers just touching the lowest rib. Keep the thumb and fingers in a natural position and the tips of the fingers just out of sight. Figure 1.

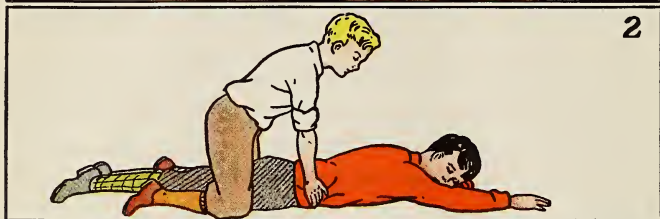
3. While counting *one, two*, in one second intervals, and with arms held straight, swing forward slowly so that the weight of your body is gradually brought to bear upon the person. The shoulder should be directly over the hand at the end of the forward swing. Do not bend the elbows. See Figure 2.

4. Swing immediately backward, counting *three*, so that the pressure is completely removed. Figure 3.

5. Rest while counting *four* and *five*.

6. Swing forward again and continue artificial respiration until natural breathing is restored. Keep it up for three or four hours if necessary or until a physician decides that there is no further need to continue it.

Artificial respiration should be carried on at the place where the accident happened. As soon as the movements have started, another person should loosen the clothing about the person's neck, chest, and waist. Apply warmth from blankets, hot water bottles, or in other ways help make up for the loss



of heat from the body. Do not pour liquids down the throat of a person who is unconscious. Some of the liquid is likely to get into the windpipe.

It is best not to move the person until normal breathing has been restored. If it should be necessary to move the person, keep him lying down, and continue the breathing movements while he is being moved. If it is necessary to change the person giv-



ing the first aid treatment, the change should be made without losing the regular rhythm of the breathing movements. Remember that natural breathing at such times may only be temporary. Watch the patient, and if natural breathing stops, begin the artificial breathing movements again.

After the person begins to breathe naturally and recovers consciousness, he should be kept lying down to prevent too much strain upon the heart. At this time a stimulant such as aromatic spirits of ammonia or a drink of hot coffee may be given.

### **Treatment of Sprains and Bruises:**

Sprains and bruises are painful injuries that are often caused by a sudden pulling, twisting, or tearing of muscle fibers and tendons. They often result from falls. The injury also breaks tiny blood vessels and the injured part begins to swell. If cold can be applied at once, it helps to check the swelling. This should shortly be followed by applying heat to the sprain and bruise. If the swelling has already taken place, heat rather than cold should be applied. The heat assists nature in the removal of the swelling and the repair of the damaged parts. The injured part should also be rested to aid in its cure.

### **Broken Bones:**

When a person breaks a bone, try to make him as comfortable as possible until the doctor comes



### *SOME USEFUL FORMS OF SPLINTS*

without moving him any more than necessary. The sharp edges of a broken bone may cut through the skin and make the wound more serious, unless care is taken to prevent it. If it is necessary to move a person with a broken bone, make a splint to support the injured parts. As shown in the drawing above, this can be done by placing boards or other stiff material at the sides and bandaging carefully to hold them in place. After the bone has been set, it is important, by means of the X-ray, to check upon the position of the broken ends, before the healing has commenced. Broken bones are repaired by the gradual hardening of the fluid which collects around the injured parts.

## **When Poisons Are Swallowed:**

One of the best ways to prevent accidents from poisoning is to keep them out of the reach of little children who do not understand how dangerous they are. Persons sometimes keep poisons in bottles that are made with rough surfaces, so that they can be distinguished from others, even in the dark. Never take unknown pills or other medicines.

When a poison has been swallowed, tell your parents or another grown-up person and get in touch with a doctor at once. In most cases it is helpful to cause vomiting. The times when it is not best to cause vomiting are when a strong acid such as carboic acid or a strong solution such as lye has been swallowed. In these cases the vomiting would add to the burns already caused by these substances. Persons can often be made to vomit by giving them a drink made by mixing mustard in some warm water. Tickling the back of the throat is also useful in causing a person to vomit.

It is helpful to give a person large amounts of the whites of eggs as a first aid treatment. Mix the whites of several eggs in water and have the person drink as much as possible.

The proper treatment for any poisoning is to give the person something that will overcome the effects of the particular poison that has been swallowed. In many cases the antidote, as it is called, is printed on the label of the bottle or package. It can also be

obtained from handy reference books that are to be found in many homes, or it can be obtained by telephone from a hospital or a physician, while waiting for the doctor to arrive.

## THINGS TO DO AND THINK ABOUT

### A. For Answer and Discussion:

1. What are meant by safety habits? Why is it valuable to make safety precautions into habits?
2. Describe some good safety habits to use in connection with the traffic on streets and highways:
  - a. When crossing the street.
  - b. When walking on highways without sidewalks.
  - c. When getting on and off vehicles.
  - d. When playing games.
3. What are some of the dangers, and the precautions that should be taken to prevent accidents in connection with:
  - a. Street repairs and building operations.
  - b. Rubbish and ash containers.
  - c. Broken or fallen wires.
4. Falls cause many accidents in the home. What precautions should be taken to prevent them?
5. What is meant by first aid treatment?
6. Falls often result in sprains, bruises, or broken bones. What helpful first aid treatment should be given to each of these injuries?
7. What are some of the dangers from cuts and wounds? How should they be treated?

8. What are some precautions that help to prevent fires: (a) in the home? (b) in the woods or forests?

9. Describe the proper first aid treatment for burns.

10. In what parts of a school building are accidents more likely to happen? What precautions should be taken to prevent these accidents?

11. An accident may easily spoil a vacation. What are some precautions that should be taken to prevent accidents in connection with:

a. Swimming and diving.

b. Exposure to the sun.

c. Ice skating; roller skating.

12. What is meant by artificial respiration? For what accidents is it a first aid treatment? Describe how it is done.

## **B. A Junior Safety Council:**

Many schools help to make their safety education work more useful by the forming of a Junior Safety Council. These schools usually follow the suggestions given in the *Handbook on Junior Safety Councils*, prepared by the National Safety Council, New York City. In other schools, there are Safety Clubs, Safety Committees, or Safety Scouts that are planned to do about the same kind of work as the Junior Safety Council.

A Junior Safety Council is a group of pupils made up of representatives from the different classes in the school, the officers of the School Safety

Patrol, and representatives of other groups in the school that are connected in some way with the work of safety. The Safety Council elects its own officers, and is under the general guidance of a member of the faculty of the school.

With the help of the Safety Council, it becomes easier to get all the pupils in the school thinking about safety problems of general interest, and also the particular dangers that are found in the school, in the neighborhood, and at different seasons of the year. The classroom representatives bring the results of class discussions to the Council for consideration, and they also take back to the classrooms the ideas and suggestions that are developed in the Council meetings.

An idea of the extent of the work of a Junior Safety Council can be obtained from the different committees that can be formed to carry on its work, and from some suggestions that are given in the *Handbook* for topics for monthly and special programs:

*Suggested Committees:*

- |                        |                |
|------------------------|----------------|
| 1. Program.            | 4. Publicity.  |
| 2. Safety Patrol.      | 5. Inspection. |
| 3. Accident Reporting. |                |

*Some Suggested Topics for Meetings:*

- |                  |                    |
|------------------|--------------------|
| Common Causes of | Helping Santa Play |
| Fire in the Com- | Safe.              |
| munity.          | Safety for the     |
| Winter Sports.   | Household.         |



Electricity.

Playground Safety.

School Accidents.

Firearms.

Bicycles.

The Eye and Its

Relation to

Safety.

The Junior Safety Council will also play an important part in representing the school in special drives and campaigns in the community, such as "Clean-Up Week," "An Orderly Hallowe'en," "A Safe and Sane Fourth of July," and many others.

The Junior Safety Council, or some other safety group within the school or a classroom can be made a very useful part of the safety education work of the school community. It will take its place very naturally in a modern school with the other pupil committees or activity groups that help to make this part of school work interesting and helpful.

### **C. For the Health and Safety Notebook and Bulletin Board:**

1. Pictures of safe and unsafe practices on streets and highways, in the school and home, and on the playground.

2. Clippings of accidents that could serve as reminders of the precautions that should be taken to prevent them.

### **D. For the Library Reference Table:**

1. *Safety Education Magazine*, published by the National Safety Council, New York City.

2. *The Junior Safety Council—A Handbook for the Schools*, published by the Education Division, National Safety Council, New York City.

# USEFUL INFORMATION AND SUGGESTIONS

## Daily Program for the School Child

### Morning

Rise early so that you will not need to rush.

Take a bath or a good wash. Clean the teeth.

Put on clean clothing.

Take time to eat a good breakfast. If possible, include a well-cooked cereal.

After breakfast, go to the toilet.

A mid-morning lunch of milk and crackers is better for you than a piece of candy at recess.

Have a warm meal, or at least one warm dish or drink at noon.

### Afternoon

After school, be sure to play outdoors in the fresh air and sunshine.

A mid-afternoon lunch of milk and crackers or bread, or some fruit, is better for you than candy or cake.

Rest quietly for at least one-half hour.

Play quietly, read, or rest before the evening meal.

Be sure to eat some fresh vegetables or fresh fruit with the evening meal.

Rest for awhile after the meal.

### Evening

Go to bed early so that you can arise early in the morning without being called.

For quiet sleep avoid thrills or too great excitement just before going to bed.

Visit the toilet in order that your rest may not be disturbed.

Take a warm bath or a good wash. This is one of the important times for cleaning the teeth.

Hang up the day clothing carefully. Put on fresh night clothing.

Let plenty of fresh air into the bedroom, but no drafts.

Use enough covers, but not too many. If you have too many or too few, your rest will be disturbed.

### General Rules

Play fairly. Learn to get along pleasantly with others.

Balance all things. Alternate work, play, and rest.

Do not carry anything to an extreme. Be moderate.

Breathe fresh air at all times, indoors or out.

Eat and drink at least one quart of milk daily.

Learn to like fresh fruits and fresh vegetables.

Eat at least one green leafy vegetable each day.

Wash before meals. Eat and drink slowly. Brush the teeth after meals.

Eat very little candy or sweets between meals. They are best taken as dessert at the end of or immediately after meals.

Make no exceptions. Include Sundays and holidays on your health program.

Have physical defects corrected immediately.

### The School Lunch

If your school has a school lunch counter, be sure to use it. There you will get the best foods to keep you strong and healthy.

The following suggestive menus from Farmers' Bulletin Number 712, United States Department of Agriculture, Washington, D. C., will prove helpful in planning this important mid-day meal. This bulletin also contains additional suggestions and recipes for school lunches.

A.—Suggested menus for lunches prepared and eaten at home:

1. Eggs, boiled, coddled, poached, or scrambled; bread and butter; spinach or other greens; plain cake.
2. Beef stew with vegetables; crisp, thin tea biscuits; honey.
3. Dried bean or pea or peanut butter puree; toast; baked apple; cookies.
4. Vegetable-milk soup; zwieback; rice with maple sugar and butter, milk, or cream.
5. Potato chowder; crackers; jelly sandwiches.
6. Cold meat; creamed potatoes; peas; bread and butter; frozen custard or plain ice cream; plain cake.
7. Lamb chop; baked potatoes; bread and butter; sliced bananas and oranges; cookies.
8. Baked omelet with spinach, kale, or other greens; bread and butter; apple sauce; cake.
9. Milk toast; string beans; stewed dried fruit; cake.
10. Boiled potatoes; codfish gravy; bread and butter; lettuce; custard.

**B.**—Suggested menus for basket or box lunches, —prepared at home and eaten in school:

Sandwiches with sliced tender meat for filling; baked apple; cookies, or a few lumps of sugar.

Slices of meat loaf or bean loaf; sandwiches; stewed fruit; small frosted cake.

Crisp rolls, hollowed out and filled with chopped meat or fish, moistened and seasoned, or mixed with salad dressing; orange, apple, a mixture of sliced fruits, or berries; cake.

Lettuce or celery sandwiches; cup custard; jelly sandwiches.

Cottage-cheese sandwiches, or a pot of cream cheese with bread-and-butter sandwiches; peanut sandwiches; fruit; cake.

Hard-boiled eggs; baking-powder biscuits; celery or radishes; brown-sugar or maple-sugar sandwiches.

Bottle of milk; thin corn bread and butter; dates; apple.

Raisin or nut bread with butter; cheese; orange; maple sugar.

Baked bean and lettuce sandwiches; apple sauce; sweet chocolate.

**C.**—Suggested menus for school lunches, prepared and eaten in school:

1. Vegetable-milk soup; crackers; rolls; fruit; plain cake.

2. Meat and vegetable stew; bread and butter; sweet chocolate.

3. Boiled custard; lettuce sandwiches; fruit; cookies.

4. Dried codfish chowder; crackers; fruit; maple-sugar or jelly sandwiches.

## **The School Doctor and the School Nurse**

Many schools, especially those in cities, have school doctors and school nurses to help boys and girls, and to make friendly suggestions to improve their health.

Remember, they are your friends—they are trying to help you.

Generally they give a medical examination to each boy and girl at least once a year. If they find anything about you that needs attention, anything that should be fixed, it is important that you have it attended to right away.

### An Inexpensive Quart of Tooth Powder

“If you secure a clean, dry Mason jar, quart size, nearly any druggist will put up the following formula for a tooth powder at little cost. Do not use it immediately but shake it thoroughly, now and then, for the first twenty-four hours. This will mix the powders and permit the oils to have sufficient time to permeate all of the ingredients.

“When using, place some of the powder in a small, wide-mouthed bottle and then shake some of the powder onto the toothbrush that has previously been thoroughly wet. Keep the bottle and the Mason jar tightly closed.

#### *Formula for Tooth Powder*

Finest grade English precipitated chalk.....	1½ pound
Powdered Castile soap.....	1¾ ounces
Light carbonate of magnesia.....	1⅓ ounce
Oil of clove.....	46 drops
Oil of wintergreen.....	35 drops
Oil of sassafras.....	35 drops
Oil of peppermint.....	18 drops
Saccharine—finely powdered.....	4 grains.”

Adapted from directions on Care of the Teeth, issued by City Board of Health, Bridgeport, Connecticut.



## TABLE OF 100-CALORY PORTIONS OF FOOD

(From Mary Swartz Rose: "A Laboratory Handbook for Dietetics")

Name of Food	Size of 100-Calory Portion	Weight of Portion in Ounces	Distribution of the Calories in Percents		
			Protein	Carbohydrate	Fat
CEREALS AND FLOUR PRODUCTS:					
Bread, white	Two slices 3 in. x 3½ in. x ½ in.	1.4	14	80	6
Crackers, soda	Four crackers, 2¾ in. x 2½ in.	0.9	10	70	20
Cornstarch pudding	One-fourth cup	2.7	9	67	24
Flour, white, sifted	Four tablespoonfuls	1.0	12	85	3
Macaroni, cooked	Three-fourths cup	5.0	15	83	2
Macaroni and cheese	One-half cup	2.1	17	44	39
Oatmeal, cooked	One-half to three-quarters cup	4.8	17	67	16
Rice, steamed	Three-quarters cup	4.0	9	90	1
DAIRY PRODUCTS:					
Butter	One level teaspoonful	0.5	0	0	100
Buttermilk	One & one-eighth cups	9.9	33	54	13
Cheese, full cream	Piece, 2 in. x 1 in. x ¾ in.	0.9	25	3	72
Cheese, soft cream	Two tablespoonfuls	0.9	12	1	87
Cocoa, ½ milk and ½ water	Two-thirds cup	5.5	14	47	39
Cream, thick	One and two-thirds tablespoonfuls	0.6	2	3	95
Ice cream, commercial	One-quarter cup	1.6	4	33	63
Milk, whole	Five-eighths cup	5.1	19	29	52
Milk, skim	One & one-eighth cups	9.6	37	56	7
Oleomargarine	One tablespoonful	0.5	1	0	99
FRUITS:					
Apples, fresh	One large	7.5	3	92	5
Bananas	One medium	5.5	5	89	6
Figs, dried	One and one-half, large	1.1	5	94	1
Grapefruit, in skin	One-half, large	10.0	7	89	4
Oranges	One large	9.5	7	91	2
Orange juice	One cup	8.2	0	100	0
Pineapple, fresh	Two slices, 1 in. thick	8.2	4	90	6

TABLE OF 100-CALORY PORTIONS OF FOOD—*Contd.*

(From Mary Swartz Rose: "A Laboratory Handbook for Dietetics")

Name of Food	Size of 100-Calory Portion	Weight of Portion in Ounces	Distribution of the Calories in Percents		
			Protein	Carbohydrate	Fat
Pineapple, canned	One slice, 3 tablespoonfuls, $\frac{1}{4}$ cup shredded	2.3	1	95	4
Prunes, stewed and sweetened	Two prunes and two tablespoonfuls juice	2.8	2	98	0
<b>MEATS, FISH, POULTRY, AND EGGS:</b>					
Bacon, cooked	Four to five small pieces	0.5	13	0	87
Beef, roast	Slice, 5 in. x $2\frac{1}{2}$ in. x $\frac{1}{4}$ in.	1.6	46	0	54
Chicken, creamed	One-fourth cup	1.6	16	11	73
Eggs, raw	One & one-third eggs	2.7	36	0	64
Halibut steak, cooked	Piece, 3 in. x $1\frac{1}{4}$ in. x 1 in.	3.0	61	0	39
Ham, boiled	Slice, $4\frac{3}{4}$ in. x 4 in. x $\frac{1}{8}$ in.	1.3	29	0	71
Lamb chops, broiled	One chop, 2 in. x $1\frac{1}{2}$ in. x $\frac{3}{4}$ in.	1.6	40	0	60
Oysters	6-15 oysters ( $\frac{2}{3}$ cup solids)	7.2	49	27	24
Salmon, canned	One-half cup	1.8	45	0	55
<b>SUGAR:</b>					
Sugar, granulated	Two tablespoonfuls	0.9	0	100	0
<b>VEGETABLES:</b>					
Asparagus	20 large stalks, 8 in. long	15.9	32	60	8
Baked beans, canned	One-third cup	2.7	21	61	18
Cabbage, shredded	Four to five cups	11.2	20	71	9
Carrots, fresh	$1\frac{2}{3}$ cups ( $\frac{1}{2}$ " cubes)	7.8	10	82	8
Cauliflower	1 small head ( $4\frac{1}{2}$ " in diameter)	11.5	23	62	15
Celery	4 cups ( $\frac{1}{4}$ " pieces)	19.1	24	71	5
Lettuce	Two large heads	18.7	12	80	8
Tomatoes, fresh	Two to three medium size	15.5	16	68	16

## WEIGHT—HEIGHT—AGE TABLE FOR GIRLS OF SCHOOL AGE†

Height (inches)	Average weight for height (lbs.)	5 Years	6 Years	7 Years	8 Years	9 Years	10 Years	11 Years	12 Years	13 Years	14 Years	15 Years	16 Years	17 Years	18 Years	Height (inches)
38	33	33	33													38
39	34	34	34													39
40	36	36	36	36*												40
41	37	37	37	37*												41
42	39	39	39	39*												42
43	41	41	41	41	41*											43
44	42	42	42	42	42*											44
45	45	45	45	45	45	45*										45
46	47	47*	47	47	48	48*										46
47	50	49*	50	50	50	50	50*									47
48	52		52	52	52	52	53*	53*								48
49	55		54	54	55	55	56	56*								49
50	58		56*	56	57	58	59	61	62*							50
51	61			59	60	61	61	63	65							51
52	64			63*	64	64	64	65	67							52
53	68			66*	67	67	68	68	69	71*						53
54	71				69	70	70	71	71	73*						54
55	75				72*	74	74	74	75	77	78*					55
56	79					76	78	78	79	81	83*					56
57	84					80*	82	82	82	84	88	92*				57
58	89						84	86	86	88	93	96*	101*			58
59	95						87	90	90	92	96	100	103*	104*		59
60	101						91*	95	95	97	101	105	108	109	111*	60
61	108							99	100	101	105	108	112	113	116	61
62	114							104*	105	106	109	113	115	117	118	62
63	118								110	110	112	116	117	119	120	63
64	121								114*	115	117	119	120	122	123	64
65	125								118*	120	121	122	123	125	126	65
66	129									124	124	125	128	129	130	66
67	133									128*	130	131	133	133	135	67
68	138									131*	133	135	136	138	138	68
69	142										135*	137*	138*	140*	142*	69
70	144										136*	138*	140*	142*	144*	70
71	145										138*	140*	142*	144*	145*	71

†Prepared by Bird T. Baldwin, Ph.D., Iowa Child Welfare Research Station, State University of Iowa, and Thomas D. Wood, M.D., Columbia University, New York.

## WEIGHT—HEIGHT—AGE TABLE FOR BOYS OF SCHOOL AGE†

Height (inches)	Average weight for height (lbs.)	5 Years	6 Years	7 Years	8 Years	9 Years	10 Years	11 Years	12 Years	13 Years	14 Years	15 Years	16 Years	17 Years	18 Years	19 Years	Height (inches)
38	34	34	34*														38
39	35	35	35*														39
40	36	36	36*														40
41	38	38	38														41
42	39	39	39	38*													42
43	41	41	41	41*	39*												43
44	44	44	44	44*	44*												44
45	46	46	46	46*	46*												45
46	48	47*	48	48	48	46*											46
47	50	49*	50	50	50	50*											47
48	53		52	53	53	53*											48
49	55		55	55	55	55	55*	55*									49
50	58		57*	58	58	58	58	58*	58*								50
51	61			61	61	61	61	61	61*								51
52	64			63	64	64	64	64	64	64*							52
53	68			66*	67	67	67	67	68	68*							53
54	71				70	70	70	70	71	71	72*						54
55	74				72*	72	73	73	74	74*							55
56	78				75*	76	77	77	78	78							56
57	82					79*	80	81	81	82							57
58	85					83*	84	84	85	85	86	80*					58
59	89						87	88	89	89	90	87	90				59
60	94						91*	92	92	93	94	95	96				60
61	99							95	96	97	99	100	103				61
62	104							100*	101	102	103	104	107	106*			62
63	111							105*	106	107	108	110	113	111	116*		63
64	117								109	111	113	115	117	121	126	127*	64
65	123									114*	117	120	122	127	131	134	65
66	129										119	122	125	132	136	139	66
67	133										124*	128	130	136	139	142	67
68	139											134	134	137	141	143	68
69	144											137	139	143	146	149	69
70	147											143	144	145	148	151	70
71	152											148*	150	151	152	154	71
72	157												153	155	156	158	72
73	163												157*	160	162	164	73
74	169												160*	164	168	170	74

†Age is taken at the nearest birthday; height at the nearest inch; and weight at the nearest pound. A child is considered 6 years old at any time between 5½ and 6½ years.

The figures not starred represent exact averages in round numbers.

The starred figures represent smoothed or interpolated values.

## Monthly Weight and Height Record

Set aside a part of a notebook for keeping the records of your height and weight as measured throughout the year. On these pages, you can paste a printed form, if you obtain one, or you could rule it like the forms on page 310.

*General Directions:* Begin by placing the first weight record on about the fifteenth line from the top. Place the actual number of pounds on this same line in the column headed "Weight in Pounds." Fill in this column by adding one pound for each line as you go toward the top. Show the weight each month by placing an X in the proper monthly column, opposite to the figure which represents the weight in pounds at the time of each weighing. For example, the X's in the chart on page 310 tell us that the pupil weighed 83 pounds in February and 84 pounds in March. Of course, the figures on your chart would be those which represent your own weight. These are only samples.

If your teacher or your doctor should tell you about what you should weigh at the end of the year, you could draw a heavy line across the chart at this figure. This would act as a goal for you during the year.

## Monthly Weight and Height Record

-----  
Date

-----  
Name of Pupil

-----  
Grade

-----  
Teacher

WEIGHT IN POUNDS	DATE									
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June
						20	20			
89										
88										
87										
86										
85										
84							×			
83						×				
82										
81										
80										
79										

(Rule about twenty or twenty-five lines.)

RESULTS	First Record	Mid- Year	Last Record	Gain
Age (years and months)				
Height (inches)				
Weight (pounds)				
Normal Weight				



# GLOSSARY

This glossary is a short dictionary of a number of the words commonly used in health education. It will aid in the pronunciation and understanding of words that may be new to you or with which you need additional help. The definitions are brief. Fuller explanations will usually be found in the text on the pages that are indicated in the index.

**Syllables and accent:** In the word in the parentheses the syllables are separated to aid in pronouncing them. The syllable to be accented is marked thus '. When there is more than one syllable in a word to be stressed, the principal accent is marked with a heavier line, thus ', and the less accented syllable with a lighter line, thus '.

## Key to Sounds

ā as in āte, fāte	ō as in ōld
ā̇ as in vā-ca'tion	ō̇ as in ō-bey'
â as in câre, pār'ent	ô as in ôr'der, lôrd
ă as in căt, ăm	ö as in ödd, nôt
ǎ as in in'fănt, fin'ăl	ő as in őc-cur', cǒn-nect'
ä as in ärm, fä'ther	
å as in åsk, gråss	oi as in oil, noisy
á as in á-bove', á-bout'	ōō as in fōōd, mōōn
	ō̇ as in fō̇t
ē as in ēve	ou as in out
ē̇ as in ē-vent'	
ě as in ěnd	ū as in pūre
ě̇ as in si'lěnt, move'měnt	û as in û-nite'
ē as in moth'ēr	û as in bûrn
	ű as in űp, űn'der
ī as in īce, sīght	ű̇ as in cir'cűs
ĩ as in ĩll, hab'īt	

**abdomen** (ăb-dŏ'měn). The large cavity below the diaphragm, containing the stomach, intestines, liver, and kidneys.

**abscess** (ăb'sēs). A collection of pus at some point in the body.

**absorption** (ăb-sŏrp'shŭn). The process by which nourishing material is taken through the lining of the digestive system into the blood.

**acid** (ăs'ĭd). A substance that is sour, sharp, or biting to the taste.

**addict** (ăd'ikt). One who has developed a habit, especially a bad habit.

**adenoids** (ăd'ě-noıdz). Soft, fleshy growths that form in the passage between the nose and the throat, hindering the flow of air into the body through the nose.

**alcohol** (ăl'kō-hōl). A colorless liquid made by fermentation. The narcotic and intoxicating substance in beer, wine, and whiskey.

**alimentary canal** (ăl'ı-měň'tá-rı ká-năl). The long, continuous tube extending through the body in which digestion takes place. It consists of the mouth, esophagus, stomach, and intestines.

**antibody** (ăn'tı-bōd'ı). Substance in the blood which acts against toxins, or the bacteria producing toxins.

**antidote** (ăn'tı-dōt). A substance that offsets, or neutralizes the effects of certain poisons.

**antitoxin** (ăn'tı-tōk'sın). Substance formed in the body which has the power to neutralize toxins (poisons) that result from the growth of disease germs.

**appetizing** (ăp'ě-tız'ıng). Pleasing to the appetite.

**artery** (ăr'tēr-ı). One of the branching tubes through which blood flows from the heart to other parts of the body.

**artesian well** (ăr-tě'zhăn wěl). A well made by boring into the earth until water is reached.

**artificial respiration** (ăr'tı-fısh'ăl rēs'pı-rā'shın). A form of mechanical breathing used to restore natural breathing in an unconscious person.

**bacteria** (băk-tě'rı-ă). Tiny plants, seen only through a microscope. The singular is **bacillus** (bă-sıl'ūs).

**balanced diet** (băl'ănst dı'ět). Foods chosen in a way that properly meets the body needs.

**beriberi** (běr'ı bēr'ı). A disease affecting the nerves, caused by a serious lack of vitamin B.

**beverage** (bēv'ēr-ıj). A liquid used for drinking.

**biceps** (bı'sēps). The large muscle of the front of the upper arm.

**bicuspid** (bı-kūs'pıd). One of the eight teeth with two points or cusps. The bicuspids are the fourth and fifth teeth on each side of the middle line of the upper and lower jaws, between the canines and the molars.

**bile** (bıl). A yellow or greenish liquid secreted by the liver, and useful in digestion.

**blister** (blis'tēr). A small swelling under the skin, filled with a watery fluid.

**blood vessel** (blūd vēs'ī). An elastic, hollow tube in the body through which blood flows.

**bowels** (bou'ēlz). The intestines.

**brain** (brān). The soft mass of nerve tissue which is enclosed within the skull, and which forms the central, controlling part of the nervous system.

**breed** (brēd). To give birth to, to be born.

**bronchial tube** (brōng'kī-āl tūb). One of the two tubes into which the windpipe divides as it enters the lungs.

**bronchitis** (brōng-kī'tīs). Inflammation of the bronchial tubes.

**caffeine** (kăf'ē-īn). The stimulating drug found in coffee and tea.

**calcium** (kăl'sī-ūm). A soft, white metal, found only in combination with some other substance, such as lime or marble. It is needed by the body to help build bones and teeth.

**calory** (kăl'ō-rī). A unit used for measuring the heat and energy values of foods.

**capillary** (kăp'ī-lēr'ī). A slender, hair-like tube—the smallest of the blood vessels of the body, joining the arteries and veins.

**carbhydrate** (kăr'bō-hī'drāt). A chemical substance made up of carbon, hydrogen, and oxygen. The principal carbhydrates are the starches, and sugars.

**carbon dioxide** (kăr'bōn dī-ōk'sid). A heavy, odorless, colorless gas.

**carbon monoxide** (kăr'bōn mōn-ōk'sid). A colorless, odorless, very poisonous gas, formed by the incomplete burning of the carbon in substances.

**cells** (sēlz). The tiny living parts of which all animals and plants are made.

**cementum** (sē-mēnt'ūm). The bone-like part of a tooth which covers its roots.

**centigrade thermometer** (sēn'tī-grād thēr-mōm'ē-tēr). A thermometer on which the freezing point of water is placed at zero degrees and the boiling point of water at one hundred degrees.

**chapped skin** (chăpt). Skin that becomes rough or cracked from exposure to cold or dampness.

**chest** (chēst). The upper part of the trunk, or main part of the

- body. It is enclosed by the ribs, and contains the heart and lungs.
- chloride of lime** (klō'rīd). A white, powdery substance used as a bleach or disinfectant.
- chorea** (kō-rē'ā). A nervous ailment accompanied by twitchings of muscles. Also known as St. Vitus' dance.
- chronic** (krōn'īk). Continuing for a long time.
- circulate** (sūr'kū-lāt). To move around in a regular course.
- cistern** (sīs'tērñ). A tank, often underground, used for the storage of rain water, or other liquids.
- citrus fruits** (sīt'rūs). Oranges, lemons, and limes.
- clinic** (klīn'īk). A place where injuries are treated, and advice is given to aid in keeping well.
- clot** (klōt). A mass of thickened material.
- cocaine** (kō'kān'). A drug used to deaden pain and cause sleep. Prepared from the leaves of the coca plant.
- combustion** (kōm-būs'chŭñ). Burning.
- communicable disease** (kō-mū'nī-kā-b'l dĩ-zēz'). A disease which can be carried, or passed from one person to another.
- constipation** (kōn'stī-pā'shŭñ). A condition of the bowels when movements are infrequent and difficult.
- corpuscle** (kōr'pūs'l) (of the blood). One of the numerous small cells, or bodies that float in the blood.
- cuspid** (kūs'pīd). A canine tooth, or the tooth with a single point, or cusp, located between the incisors (front teeth) and the bicuspid.
- dental** (dēn'tāl). Having to do with the teeth.
- dental floss** (dēn'tāl flōss). A wax-coated thread used to remove particles of food from between the teeth.
- dentine** (dēn'tēñ). A hard, bony substance forming the main part of a tooth.
- depress** (dē-prēs'). To lower or lessen the force or amount of something.
- digestion** (dī-jēs'chŭñ). The process of changing food that has been eaten into a form in which it can be used by the body for growth, repair, and energy.
- digestive juices** (dī-jēs'tīv jōos'ēz). Liquids that have the power to digest food; they are secreted by glands in the body.
- diphtheria** (dīf-thēr'ī-ā). A dangerous, communicable disease in which whitish membranes form on the lining of the throat.

**disease** (dǐ-zēz'). Illness, sickness.

**disinfect** (dīs-īn-fěkt'). To free something from germs which might cause disease.

**disinfectant** (dīs-īn-fěk'tánt). A substance which disinfects, or destroys germs.

**elimination** (ē-līm'ī-nā'shǔn). The process of getting rid of something.

**emergency** (ē-mûr'jěn-sǐ). Something that needs prompt action, an unforeseen happening or event.

**enamel** (ěn-ām'ěl). The very hard, white, glistening outer covering of the teeth.

**energy** (ěn'ēr-jǐ). Natural power, force of action.

**erect** (ē-rěkt'). Upright, straight up and down.

**esophagus** (ē-sǒf'á-gǔs). The tube which leads from the throat to the stomach. Also known as the gullet.

**eustachian tube** (ũ-stā'kǐ-ǎn tǔb). A tube connecting the middle ear with the throat.

**evaporate** (ē-vǎp'ō-rāt). To drive a part of the moisture from something.

**excessive** (ěk-sēs'iv). More than the usual amount.

**excretion** (ěks-krě'shǔn). The process of getting rid of waste materials from the body.

**expiration** (ěk'spǐ-rā'shǔn). The act of breathing out air from the lungs.

**Fahrenheit thermometer** (Fǎr'ěn-hīt thěr-mǒm'ē-těr). A person's name, given to the thermometer on which the boiling point of water is 212 degrees and water freezes at 32 degrees.

**fatigue** (fá-tēg'). Weariness resulting from work or exertion.

**filter** (fíl'těr). Any material used to remove solids from liquids, to make it clearer or more pure.

**fermentation** (fūr'měn-tā'shǔn). A chemical change in a substance, such as that which causes milk to sour, cheese to ripen, cider to turn to vinegar.

**function** (fǔngk'shǔn). The particular purpose for which a thing exists.

**gastric juice** (gǎs'trĭk jōōs). The digestive fluid secreted by glands in the stomach.

**germ** (jǔrm). A tiny living thing too small to be seen without a microscope; a microbe.

**gland** (gländ). An organ of the body that secretes fluids, such as the saliva, gastric juice, etc.

**heroin** (hěr'ō-ĭn) or (hě-rō'ĭn). A narcotic drug obtained from morphine.

**hospital** (hös'pĭt-ăl). A place for caring for the sick or injured.

**immunity** (ĭ-mŭ'nĭ-tĭ). The power of resisting disease; freedom from certain diseases.

**indigestible** (ĭn'dĭ-jĕs'tĭ-b'l). Not readily digestible.

**infection** (ĭn-fĕk'shŭn). That which causes a disease; a disease or condition caused by being infected.

**influenza** (ĭn'flō-ĕn'zä). A communicable disease, causing inflammation of the throat and bronchial tubes; more severe and serious than a cold.

**inspiration** (ĭn'spĭ-rä'shŭn). The act of breathing in.

**intestine** (ĭn-tĕs'tĭn). The lower, tube-like part of the alimentary canal.

**intestinal juice** (ĭn-tĕs'tĭ-näl jōos). A digestive fluid secreted in the intestines.

**iodine** (ĭ'ō-dĭn) or (ĭ'ō-dĭn). A chemical element, needed in small quantities by the body. Also used in the form of a brown liquid for killing germs in cuts and wounds.

**iris** (ĭ'ris). The colored part around the pupil of the eye.

**irritate** (ĭr'ĭ-tāt). To excite, disturb.

**Jenner, Dr. Edward** (Jĕn'ĕr). An English physician who discovered that vaccination protects against smallpox.

**joint** (joint). The place where two bones are joined together.

**kidneys** (kĭd'nĕz). Two bean-shaped organs, located in the abdomen near the spinal column, acting much like filters to remove waste products from the blood, to be eliminated in the urine.

**laboratory** (lăb'ō-rä-tō'rĭ). A place in which scientific tests and experiments are carried on.

**lentil** (lĕn'tĭl). The flat seed of a plant related to peas and beans.

**ligament** (lĭg'ä-mĕnt). A tough band of connective tissue which holds bones together at a joint.



**liver** (lǐv'ěr). The largest gland in the body, located in the abdomen.

**lung** (lǔng). One of the two bag-like organs located in the chest, and used for breathing.

**malaria** (má-lâr'í-á). A disease marked by chills and fever. Spread by the bite of a mosquito.

**malnutrition** (mǎl'nũ-trĩsh'ũn). Faulty or imperfect nourishment. A condition in which the body fails to use digested food substances properly.

**massage** (má-sǎzh'). To rub parts of the body as a remedy.

**measles** (měz'iz). A contagious disease, principally among children, marked by fever and red spots on the skin.

**membrane** (měm'brān). A soft, thin, flexible layer of tissue. See mucous membrane, pleura, periosteum for examples of membranes in the body.

**memorize** (měm'ô-riz). To learn something by heart.

**mental** (měn'tǎl). Having to do with the mind.

**menu** (měn'ũ). A list of the foods served at a meal; a bill of fare.

**microbe** (mĩ'krōb). A tiny animal or plant, so small that it can be seen only with the aid of a microscope.

**microscope** (mĩ'krō-skōp). An instrument with a lens, used to make tiny things seem much larger than they really are.

**molar** (mō'lār). One of the broad teeth at the back of the jaw, used for grinding our food.

**morphine** (môr'fēn). A drug made from opium and used to deaden pain or cause sleep.

**mosquito** (mũs-kē'tō). A small, two-winged insect, annoying by its bites. Some mosquitoes carry the germs of malaria and yellow fever.

**motor nerve** (mō'těr nърv). Nerve which carries messages from the brain or spinal cord to the muscles of the body.

**muscular** (mũs'kũ-lār). Having to do with muscles.

**narcotic** (nār-kōt'ík). A substance that lessens pain, and causes sleep.

**nervous** (nър'vũs). Excitable, easily annoyed, fearful, or timid.

**nervous system** (nър'vũs sĩs'tēm). The brain, spinal cord and the nerves.

**nervousness** (nър'vũs-nēs). State of being nervous.

**nicotine** (nĩk'ô-tĩn). A very poisonous substance found in tobacco.

**normal** (nôr'măl). Being of the regular, or usual kind.

**nostril** (nös'trîl). One of the two outer openings of the nose.

**oculist** (ök'û-lîst). A physician who specializes in the treatment of diseases of the eye. (Specializes: gives especial attention to).

**ophthalmologist** (ôf'thăl-môl'ô-jîst). A physician who specializes in the study and treatment of defects and diseases of the eye.

**opium** (ô'pî-ûm). A drug which dulls pain and produces sleep; obtained from a certain kind of poppy.

**optic nerve** (öp'tîk nûrv). The nerve of sight.

**optician** (öp-tîsh'ăn). A person who makes or sells eyeglasses.

**optometrist** (öp-tôm'ê-trîst). A person who tests eyes to discover defects in vision or sight.

**organ** (ôr'găn). A part of the body that serves a certain purpose, such as the eye, ear, stomach, etc.

**oxidation** (ök'sî-dă'shŭn). The process of being combined with oxygen.

**oxidize** (ök'sî-dîz). To combine with oxygen.

**oxygen** (ök'sî-jên). A colorless, tasteless gas found in the air. A constant supply is needed to keep us alive.

**pancreatic juice** (păn'krê-ăt'îk). The digestive juice secreted by the pancreas.

**Pasteur, Louis** (Päs'tûr, Lōō'îs). Born 1822; died 1895. A famous French chemist who proved germs were a cause of disease.

**pasteurize** (päs'têr-iz). To heat a liquid to a temperature where harmful germs are killed, without greatly changing the nature of the substance.

**perspiration** (pûr'spî-ră'shŭn). Sweat.

**phosphorus** (fôs'fô-rŭs). A chemical element. A yellowish-white poisonous substance. A small quantity, obtained from foods, is needed by the body for proper growth.

**physical defect** (fiz'î-kăl dê-fěkt'). An imperfect, abnormal, or diseased part of the body.

**physician** (fî-zîsh'ăn). One who is specially trained in the treatment of diseases; a doctor of medicine.

**pneumonia** (nŭ-mō-nî-ă). A disease in which there is inflammation of the lungs, together with a collection of fluid in them.

**pollute** (pŏ-lŭt'). To soil, or make unclean.

**protein** (prō'tê-în). An important food substance needed for the growth and repair of body cells.

**pulp** (pŭlp). The soft sensitive tissue filling the hollow spaces in the roots of the teeth.

**pus** (pŭs). The white or yellowish-white substance formed in sores and abscesses. It consists of living and dead white corpuscles, bacteria, and tissue.

**quarantine** (kwŏr'ăn-tĕn). The time during which the movement of persons is restricted to prevent the spread of a contagious disease.

**refrigerator** (rĕ-frĭj'ĕr-ă'tĕr). A box or room in which things are kept to keep them cold.

**relax** (rĕ-lăks'). To make less firm or rigid; to rest.

**respiration** (rĕs'pĭ-ră'shŭn). The act or process of breathing.

**respiratory disease** (rĕ-spĭr'ă-tŏ'rĭ dĩ-zĕz'). A disease affecting the organs of breathing.

**retina** (rĕt'ĭ-nă). The inner coat of the eyeball containing the ends of the nerve of sight.

**rheumatism** (rŏŏ'mă-tĭz'm). A disease in which there is a stiffness and pain in the muscles and joints.

**rheumatic fever** (rŏŏ-mă'tĭk fĕ'vĕr). A disease chiefly affecting children and young adults, marked by fever and inflammation, and pain in and around the joints. It is made more serious because of the damage it often does to the heart.

**rhythm** (rĭth'm). The regular repeating, or repetition of something, such as a movement, sound.

**roughage** (rŭf'ĭj). Coarse, bulky food.

**saliva** (să-lĭ'vă). A watery fluid which forms naturally in the mouth; the sputum or spit.

**sandwich** (sănd'wĭch). Two or more slices of bread with food between them.

**sanitary** (săn'ĭ-tă-r-ĭ). Pertaining or relating to health.

**scalp** (skălp). The skin on the top of the head that is usually covered with hair.

**Schick test** (Shĭk tĕst). A test in which a small amount of diphtheria toxin is injected beneath the skin to determine, from the appearance of the skin a short time afterward, whether a person is liable to develop diphtheria.

**scurvy** (skŭr'vĭ). A disease characterized by loss of weight, weakness, and spongy, bleeding gums. Caused largely by a severe lack of vitamin C.

**secrete** (sê-krēt'). To separate materials from the blood and make them into a new substance.

**secretion** (sê-krē'shŭn). The formation in the body of a new substance from materials contained in the blood; the substance formed, such as the saliva or gastric juice.

**sensitive** (sěn'sŭ-tĭv). Readily or quickly affected by the action of light, heat, sound, pressure or other things that affect a person's nerves.

**sensory nerve** (sěn'sō-rĭ nŭrv). Nerves carrying feelings from different parts of the body to the brain or spinal cord.

**septic tank** (sĕp'tĭk). A tank in which body wastes are broken up by bacteria.

**serum** (sēr'ŭm). The watery part of the blood; in the prevention of a disease, it is a watery fluid obtained from the blood of animals in which antitoxins have been formed in order to use these antitoxins to prevent the disease in human beings.

**skill** (skĭl). Ability that comes from training or practice.

**skull** (skŭl). The bony case that forms the head, and protects the brain.

**smallpox** (smôl'pŏks'). A contagious disease in which there is fever, and a breaking out or eruption on the skin. (The word pox means a disease that causes a breaking out or eruption on the skin.)

**sneeze** (snēz). Effect produced when air is forced violently out through the mouth and nose.

**socket** (sŏk'ĕt). A hollow place or thing into which something is fitted.

**spinal column** (spĭ'nāl kŏl'ŭm). The series of small, connected bones that form the backbone of the body.

**spinal cord** (spĭ'nāl kôrd). A cord of nerve tissue extending through the backbone, or spinal column.

**splint** (splĭnt). An arrangement of pieces of wood or other materials, that can be used to keep the part of a broken bone in place.

**sprain** (sprān). An injury to muscles and ligaments due to sudden twisting or pulling.

**sputum** (spŭ'tŭm). Spit or saliva.

**stagnant** (stăg'nănt). Not flowing, motionless.

**sterile** (stĕr'ĭl). Free from germs.

**sterilize** (stĕr'ĭ-lĭz). To treat something in a way to make it free from germs.

**stimulate** (stĩm'ũ-lāt). To arouse to action; to produce greater activity.

**stomach** (stũm'ǎk). The bag-like organ of digestion into which the food goes after it has been swallowed.

**suffocation** (sũ'ǒkǎ'shũn). Unconsciousness or death produced by stopping the breath.

**symptom** (sĩmp'tũm). Any change in the body which indicates the presence of a disease, or a particular kind of disease.

**temperature** (tẽm'pẽr-á-tũr). The degree of hotness or coldness of air or water, or of the body as shown by thermometer.

**temporary** (tẽm'põ-rǎr'ĩ). Lasting for a limited time only; not permanent.

**tendon** (tẽn'dǎn). A tough cord or band of tissue connecting a muscle to a bone or other muscle.

**tetanus** (tẽt'á-nũs). A disease also known as lockjaw.

**tissue** (tĩsh'ũ). The cells and connecting parts from which the bodies of animals and plants are built up, such as bone tissue, animal tissue, nerve tissue.

**tonsil** (tõn'sĩl). A small gland on each side of the back part of the mouth.

**tourniquet** (tõor'nĩ-kẽt). A device to stop bleeding, such as a bandage or belt twisted tight by a stick.

**toxin** (tõk'sĩn). A poison produced in the body, such as that resulting from the growth of germs, or microbes.

**toxoid** (tõk'soid). A substance which has the power of causing the body to produce other substances, which help to overcome a disease, such as diphtheria.

**toxin-antitoxin** (tõk'sĩn ǎn'tĩ-tõk'sĩn). A combination of diphtheria toxin and diphtheria antitoxin injected into the blood to stimulate it to produce substances which protect the person against an attack of this disease. (See also **toxin**, and **antitoxin**.)

**trachea** (trǎ'kẽ-á). The windpipe, or tube leading to the lungs.

**triceps** (trĩ'sẽps). The large muscle which extends along the back part of the upper arm.

**tuberculosis** (tũ-bũr'kũ-lõ'sĩs). A disease, usually of the lungs, in which tissues are wasted away.

**unconscious** (ũn-kõn'shũs). A state of being asleep or not being aware of things happening round about.

**vaccinate** (vǎk'sǐ-nāt). To give a person a mild form of a disease in order to protect against a severe attack of the disease.

**vaccine** (vǎk'sēn). The substance containing germs which is injected into the blood in vaccination.

**vein** (vān). One of the blood vessels carrying blood back to the heart after it has passed around the body.

**ventilation** (vēn'ti-lā'shǔn). The provision, or circulation of fresh air.

**vermin** (vûr'mǐn). Insects, such as fleas, lice, or roaches; small animals such as rats and mice; and birds, such as hawks and owls, which trouble persons and animals.

**villus** (vǐl'ūs), plural villi (vǐl'ī). Finger-like processes of the mucous membrane of the small intestine which absorb digested food materials.

**vitamin** (vī'tā-mǐn). One of a class of substances found in most foods in their natural state and which are necessary to good health and growth.

**X-ray** (ěks-rā'). Ray of light with power to pass through most solids. X-rays produce shadows upon photographic plates to form pictures which help in determining conditions inside the body.



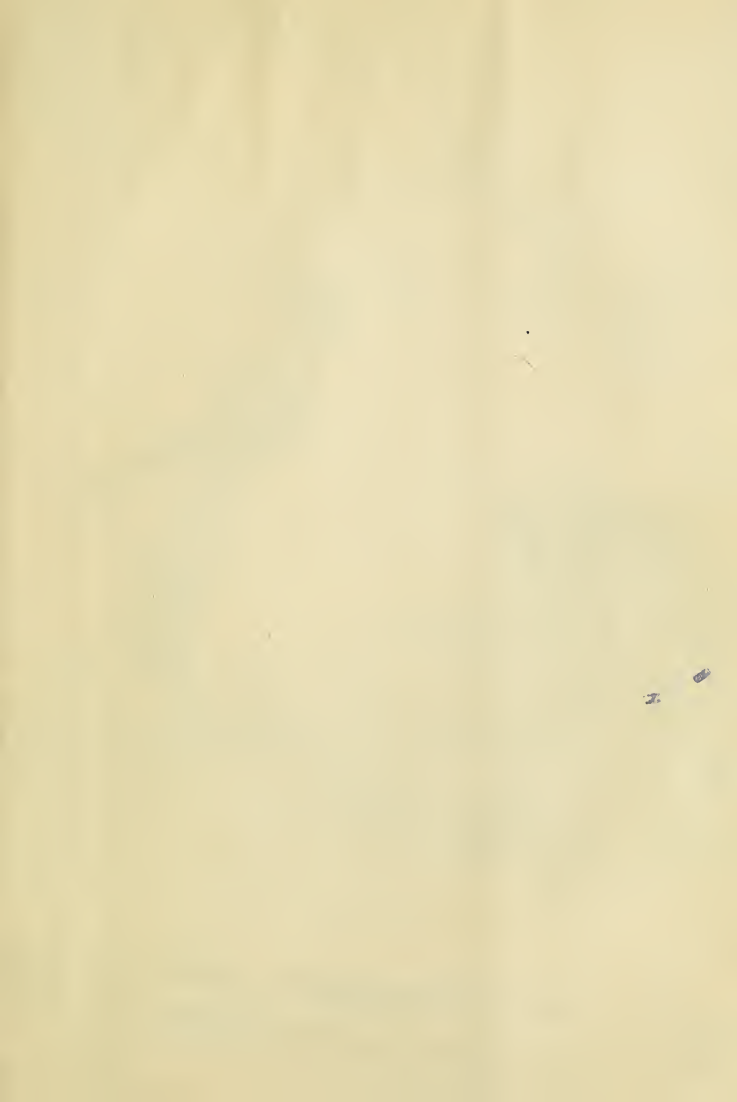
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